

SERDP

Strategic Environmental Research
and Development Program

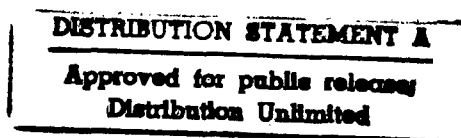
Improving Mission Readiness Through
Environmental Research

ANNUAL REPORT TO CONGRESS FISCAL YEAR 1997

A REPORT BY

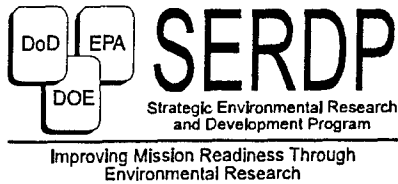
THE SCIENTIFIC ADVISORY BOARD

OF THE
STRATEGIC ENVIRONMENTAL RESEARCH
AND DEVELOPMENT PROGRAM



March 1998

19980626 058



June 18, 1998

Ms. Joyce Chiras
Defense Technical Information Center
DTIC/OCA
Suite 0944
8725 John J. Kingman Road
Ft. Belvoir, VA 22060-6218

Re: Strategic Environmental Research and Development Program (SERDP) Annual Reports to Congress - FY 1997

Dear Ms. Chiras:

Enclosed are copies of the *Annual Report to Congress - FY 1997* by the SERDP Council and the *Annual Report to Congress - FY 1997* by the SERDP Scientific Advisory Board for your use. There is no proprietary information contained within these documents so feel free to make them available to any interested parties. Both reports have also been distributed to the Library of Congress and are available for download from our website (<http://www.serdp.gov>).

Sincerely,

Lucia Valentino
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DTIC QUALITY INSPECTED 1



March 15, 1998

Mr. George T. Singley, III
Acting Director, Defense Research and Engineering
3030 Defense Pentagon, Room 3E1014
Washington, DC 20301-3030

Dear Mr. Singley:

On behalf of the Strategic Environmental Research and Development Program (SERDP) Scientific Advisory Board (SAB), I am forwarding the FY 1997 SAB Annual Report to you for submission to Congress.

During FY97, the SAB continued and expanded its activities and involvement with SERDP. The Board reviewed 18 continuing projects, valued at \$21.17 million, and 36 FY97 and FY98 new start proposals, valued at \$17.87 million.

The SAB was important in refining SERDP's strategic vision and in focusing on these goals at the meetings throughout the year. There was agreement that SERDP must address not only defense readiness-related environmental concerns, but also environmental issues concerning long-range national security policy formulation, decision making, and management.

The workshop on the needs and opportunities for Management Scale Ecosystem Research conducted by SERDP this past spring was a tremendous success, thanks in part to the involvement of select members of the SAB. This workshop provided a scientific foundation upon which to support research on detailed, specific requirements. A focused Statement of Need requesting proposals in the area of ecosystem monitoring has been issued in FY 1998 for a possible FY 1999 new start. To take advantage of our success, a Cleanup Workshop has been proposed to focus research efforts on opportunities in the cleanup area. Members of the Cleanup subcommittee, in cooperation with the American Academy of Environmental Engineers and SERDP staff, are actively involved in the planning and execution of a workshop planned for early summer.

New in FY 1997, SERDP implemented an external peer review evaluation process which the SAB considers useful and fully endorses for future years. The Board views FY 1997 as a step forward to preserve technical quality, focus on strategic environmental issues, and distribute scarce resources. Furthermore, the Board and I want to thank you for your support of SERDP.

Sincerely,

A handwritten signature in black ink, appearing to read "Michael J. Ryan". The signature is fluid and cursive, with the first name "Michael" and last name "Ryan" clearly distinguishable.

Michael J. Ryan

Chair

SERDP Scientific Advisory Board

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This document was prepared for the Executive Director, Strategic Environmental Research and Development Program (SERDP), on behalf of the SERDP Scientific Advisory Board (SAB) by

HydroGeoLogic, Inc.

under Contract Number DACA39-98-C-0004. Questions regarding SERDP should be directed to the SERDP Program Office located at 901 North Stuart Street, Suite 303, Arlington, VA, 22203.

EXECUTIVE SUMMARY

Section 2904(h) of title 10, United States Code, requires that an annual report of the Strategic Environmental Research and Development Program (SERDP) Scientific Advisory Board (SAB) be submitted to Congress no later than March 15 of each year. The Annual Report is required to describe the actions of the SAB during the preceding year and to provide any recommendations, including recommendations related to projects, programs, information exchange, and additional legislation within the scope of SERDP. This is the sixth Annual Report of the SERDP SAB and includes SAB activities and Program recommendations during FY97.

During FY 1997, the members renewed their focus on improving technical quality and an interest in maintaining a strategic vision. The members reaffirmed their position that SERDP be proactive and visionary as opposed to reactive. Each and every project was reviewed during this fiscal year in the context of the defined characteristics that are associated with a "strategic" defense R&D program. Specifically, SERDP should focus on research that is:

- essential for the solution of major defense mission-readiness related problems;
- scientifically plausible;
- focused on areas where progress under other program sponsorship in DoD and/or other agencies is not sufficient or satisfactory;
- catalytic in nature to initiate, organize, and accelerate essential research in partnership with the Federal and private sector; and
- provides sufficient proof-of-principle demonstrations to attract follow-on Research Development Test & Engineering (RDT&E) support.

Significant initiatives to these ends have contributed greatly to the overall success of the Program, specifically, an inherent desire to keep the Program focused on strategic matters of concern to the Department of Defense including the impetus for the Ecosystems Management Research Workshop.

As a group, the SAB reviewed and provided funding recommendations for 54 projects with a total value in excess of \$39 million. This year, the Board participated in a review of the Program's first non-Federal research solicitation and supported efforts by the Executive Director and Council to increase participation by the non-Federal sector. Additionally, the Board strongly encouraged leveraged funding of projects, regardless of the performer. We strongly encouraged the eventual users of technologies, specifically the three Services, to provide support and, given successful development, assurances of cooperative funding in the project's later years.

The Executive Director continued to involve fully the SAB members in most all management issues. The Board's influence on the Program extended beyond the routine process of approving projects that exceed a funding threshold, influencing the eventual balance of resources between

Thrust Areas. The Board concurred with an increase in Conservation funding and a more moderate decrease in Cleanup funds due to the potential for high return on investment over the long-term. The Executive Director encouraged the SAB to continue to participate in the following activities:

- provide recommendations in the project selection process;
- identify opportunities for technology development;
- foster technology transfer between the private sector and governmental agencies;
- determine feasibility and applicability of using Federal data resources for environmental purposes, especially in the conservation of land resources arena; and
- participate in overall strategy formulation and program management issues.

Representing a diverse membership from a host of professional backgrounds and areas of recognized expertise from this nation's scientific community, the SERDP Scientific Advisory Board provides a balanced, unbiased, and forward-looking perspective in all phases of its work. The Executive Director continues to foster a resultant synergism that is created by the gathering of this diverse expertise.

In an attempt to capture this synergism in FY 1998, the SAB will be introduced to the Services' major development programs, such as next-generation weapons/platforms. The SAB intends to take advantage of these introductory sessions to identify environmental areas of opportunity that can benefit SERDP, defense program managers, and the environmental community at large.

ORGANIZATION

The SERDP Management Structure

SERDP is a multi-agency (DoD, DOE, EPA) managed program funded by the Department of Defense. Pursuant to title 10, U.S.C., SERDP is provided general oversight and policy guidance by the SERDP Council that contains members from the SERDP participating agencies (DoD, DOE, and EPA). The Scientific Advisory Board is responsible for providing advice and recommendations to the SERDP Council on projects/proposals reviewed, and in accordance with authorizing language, the SAB may advise the Council regarding other programmatic, funding, or technically related issues with respect to the Program.

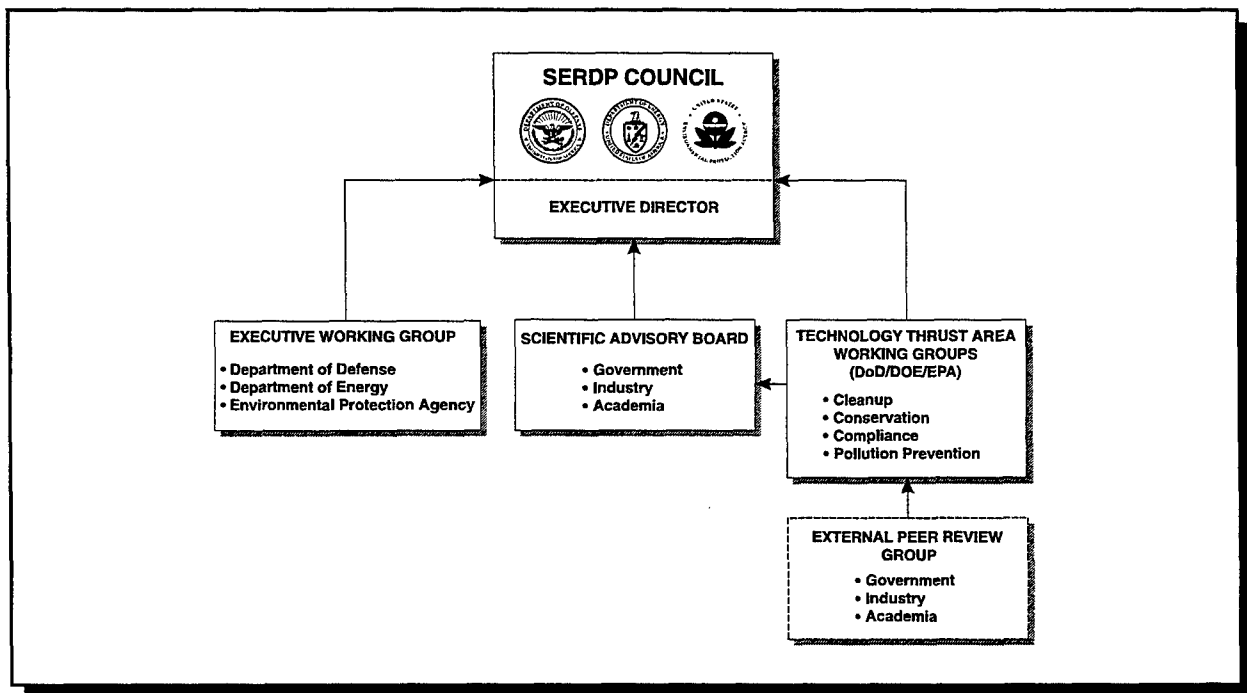


Figure 1 SERDP Organization

During FY 1997, Mr. Bradley P. Smith served as the Executive Director of SERDP and the Designated Federal Officer attending the SERDP SAB meetings in accordance with the requirements of Subsection 10(e) and (f) of the Federal Advisory Committee Act. Mr. Smith called each of the meetings in the Federal Register, approved the agendas, and attended all of the five scheduled meetings of the SERDP SAB.

The SERDP Thrust Areas

SERDP's Thrust Areas are directly in line with the four Pillars that exist within the Office of the Deputy Under Secretary of Defense for Environmental Security, namely Cleanup, Compliance, Conservation, and Pollution Prevention. SERDP conducts research to identify and promote technologies that assist to improve cleanup effectiveness and reduce resultant costs to the Department of Defense and Department of Energy; reduce the number of Notices of Violation (NOVs) and mitigate the cost impact of the NOVs; improve DoD's capability to maintain force readiness through enhancement of testing and training lands and serve as proper stewards of Federal lands; and finally, eliminate the occurrence of future hazardous and toxic impacts by materials substitution and process modifications.

Cleanup

Research in this Thrust Area focused on conducting research and development to achieve more efficient, effective environmental cleanup of soil, sediment, groundwater, surface water, and structures already contaminated by past practices with hazardous materials (including unexploded ordnance) and toxic substances. The principal focus of this area is more cost effective: cleanup/remediation techniques and technologies, monitoring and characterization methods and technologies, and assessment methods.

Compliance

Compliance research and development included technologies to support environmental monitoring, waste treatment and disposal, and environmental management not directly related to site restoration, but related to meeting current and future environmental compliance requirements. It also included end-of-pipe recycling, i.e., waste that is recycled for other than its original purpose. Further, it addressed understanding the fate and transport of defense-related air and waste water discharges.

Conservation

There is a growing need to use and maintain training and testing facilities effectively to support environmental and operational requirements. Management of natural resources is an important consideration in maintaining the use of these facilities to provide the realistic training environment in which to exercise and test the capabilities of the military forces. Therefore, efforts in this Thrust Area focused on research to understand, protect, and maintain natural resources in order to ensure (1) compliance with environmental laws [such as the National Environmental Policy Act (NEPA), the Endangered Species Act (ESA), and the National Historic Preservation Act (NHPA)]; (2) sustainable use of land and coastal resources; and (3) support for the stewardship of those resources on relevant Federal lands. Research efforts were intended to (1) predict effectively the presence, quantity, and quality of natural and cultural resources; (2) improve the knowledge of the basic natural land and coastal processes as they relate to, and are impacted by, use of lands; and (3) advance the technology to mitigate, rehabilitate, and maintain these resources.

Pollution Prevention

The focus of this Thrust Area was to conduct research and development to reduce or eliminate the creation of pollutants obviating the need for their treatment and disposal and to reduce the cost of compliance with future environmental regulations. This is achieved through source reduction and other practices such as increased efficiency in the use of raw materials including energy, water, and other resources or through material substitution. Improved technology is the catalyst for better pollution prevention. As a result, the Thrust Area focused on the need to identify alternatives for or minimize the use of hazardous and toxic chemicals/materials, identify alternative processes or technologies that result in less pollutants, improve the efficiencies of mechanical and chemical systems, and assess the life-cycle effect of materials and systems. The application of pollution prevention will positively influence the other SERDP Thrust Areas by encouraging the use of innovative, pollution reducing technologies and practices.

FY97 SAB Membership

Section 2904(a-c) of title 10, U.S.C. requires the joint appointment of members of the Scientific Advisory Board by the Secretary of Defense and the Secretary of Energy, in consultation with the Administrator of the Environmental Protection Agency. Members were solicited and nominated in accordance with the statute from the three participating agencies, the National Research Council, the National Science Foundation, the Council on Environmental Quality, as well as a representative from the States and environmental community at large. Exhibit 1 lists the members of the Board during FY 1997; Appendix A contains short biographies of each SAB member.

SAB Members and Affiliations

Dr. Walter J. Weber, Jr., Chair	—	University of Michigan
Mr. Amos S. Eno, Vice Chair	—	National Fish and Wildlife Foundation
Dr. Rosina M. Bierbaum	—	Office of Science and Technology Policy
Mr. Richard A. Carpenter	—	Environmental Consultant
Mr. Richard A. Conway	—	Union Carbide Corporation
Dr. Raymond C. Loehr	—	University of Texas
Dr. Marvin K. Moss	—	University of North Carolina
Dr. Frank L. Parker	—	Vanderbilt University
Dr. Michael J. Ryan	—	Bechtel Environmental, Inc.
Dr. Jean'ne M. Shreeve	—	University of Idaho
Dr. Lydia W. Thomas	—	Mitretek Systems, Inc.
Dr. Karen E. Wetterhahn (†)	—	Dartmouth College
Mr. Robert S. Winokur	—	National Oceanic and Atmospheric Administration
Mr. Randolph Wood	—	Nebraska Department of Environmental Quality
(†) deceased		

Exhibit 1 - Membership of the SERDP Scientific Advisory Board During FY 1997

Fourteen members served on the Board during the year, although the year ended with thirteen members. Dr. Walter J. Weber, Jr., and Mr. Amos S. Eno served as SAB Chair and Vice Chair, respectively, for a second term. Dr. Michael J. Ryan and Dr. Jean'ne M. Shreeve were nominated and elected as Chair and Vice Chair, respectively, for FY98. During the fiscal year, Dr. Rosina M. Bierbaum served as the designee for the Assistant to the President for Science and Technology. Mr. Robert S. Winokur served as the statutory member representing the Administrator of the National Oceanic and Atmospheric Administration. Members continuing their terms included Mr. Richard A. Carpenter, Mr. Richard A. Conway, Dr. Raymond C. Loehr, Dr. Marvin K. Moss,

Dr. Frank L. Parker, Dr. Michael J. Ryan, and Dr. Lydia W. Thomas. New appointees were Dr. Jean'ne M. Shreeve, Dr. Karen E. Wetterhahn, and Mr. Randolph Wood. During the course of her research involving toxicity studies with dimethyl mercury, Dr. Wetterhahn was accidentally exposed to a lethal dose of this extremely toxic substance, and she later succumbed to mercury poisoning.

The members effectively used a subcommittee structure in order to better utilize members' expertise and time in the review of more than 50 projects that were brought in front of the SAB during FY 1997. This also allowed a more effective means to handle more detailed information on specific projects and to provide follow-on review of issues and questions raised during the project review process. Exhibit 2 lists the subcommittee membership.

CLEANUP:	CONSERVATION:
Richard Conway	Rosina Bierbaum
Raymond Loehr	Richard Carpenter
Frank Parker	Amos Eno
Michael Ryan	Karen Wetterhahn
Jean'ne Shreeve	Robert Winokur
Lydia Thomas	Randolph Wood
Walter Weber	
Karen Wetterhahn	
Robert Winokur	
COMPLIANCE:	POLLUTION PREVENTION:
Rosina Bierbaum	Richard Carpenter
Richard Conway	Marvin Moss
Amos Eno	Frank Parker
Raymond Loehr	Michael Ryan
Marvin Moss	Jean'ne Shreeve
Robert Winokur	Lydia Thomas
Randolph Wood	Walter Weber

Exhibit 2 - SAB Subcommittees

ACTIVITIES AND RECOMMENDATIONS

Meetings

Section 2904, title 10, U.S.C., requires that the Scientific Advisory Board meet at least four times per year. In FY 1997, the SAB met on five occasions; one primarily to discuss their ideas on SERDP's strategic vision and four times to review and take action on new starts and continuing projects. A list of the SAB meetings held during FY 1997 is provided in Table 1. Four of the Board's meetings were held in the Washington, DC, area. The second meeting of FY97 was held in Cincinnati, OH, to provide the Board the opportunity to visit the U.S. EPA's National Risk Management Research Laboratory (NRMRL). At the conclusion of this meeting, the SAB toured the laboratory and members were briefed by Dr. Tim Oppelt, Laboratory Director, on the NRMRL's mission and activities.

SAB Meeting No.	Dates	Location	Projects Briefed		
			Ongoing	New Starts	Total
1	October 16-17, 1996	Federal Highway Administration Conference Room Arlington, VA	0	1	1
2	April 22-23, 1997	Crowne Plaza Hotel Cincinnati, OH	6	2	8
3	June 18-19, 1997	Arlington Hilton Hotel Arlington, VA	12	1	13
4	August 19-20, 1997	Arlington Hilton Hotel Arlington, VA	2	10	12
5	September 23-25, 1997	Federal Highway Administration Conference Room Arlington, VA	0	21	21

Table 1 - Summary of FY97 SAB Meetings

In accordance with the Federal Advisory Committee Act, announcements of all meetings were published in the Federal Register; the meetings were open to the public; detailed records of events were documented; and all records, reports, minutes, working papers, and agendas were made available for public inspection.

Activities

During FY 1997 the SAB reviewed all proposed new research projects as well as continuing projects with a funding request approaching or in excess of \$900,000. The Board also made recommendations to the SERDP Council through the Executive Director regarding the projects reviewed, assisted and advised the Council in identifying environmental opportunities, and provided advice on other environmental issues within the scope of SERDP. The following sections discuss each of these activities in more detail.

'Strategic' Nature of SERDP

The SAB dedicated most of the first meeting of the year to discuss the meaning and implementation of 'strategic' as it relates to the Program. After considering legislative intent and acknowledging that SERDP is the DoD 'corporate' environmental quality R&D program, the Board agreed that,

"SERDP should be proactive and visionary as opposed to reactive and, as such, should focus on undertaking high-risk, potentially high-payoff research and development projects. Such projects are commonly long term in nature and, in all cases, projects that are best carried out by partnerships among the Services, other participating Federal agencies, academia, and the private sector. SERDP must address not only defense industrial complex and DoD force readiness-related environmental concerns and issues, but also strategic environmental issues of concern to long-range national security policy formulation, decision making, and management. Environmental degradation directly impacts both human and ecological health and well-being, as well as indigenous natural resources and economic viability. Environmental integrity is thus recognized clearly as key to the economic and social welfare of nations."

The balance of the year's meetings were conducted with this vision in the forefront of each member's mind, and a part of each meeting was dedicated to discussions involving 'strategic' issues.

During FY 1997 the Board identified a potential catalytic role for SERDP in initiating and/or executing ecological research at the management scale; a dedicated attempt by the SAB to focus SERDP resources on a matter of strategic importance. As ecosystem management is becoming the basis for the future management of DoD lands and waters, the SAB has recognized that too often it is assumed that the fundamental scientific understanding of management actions is adequate. In reality, there may be significant deficiencies in fundamental ecological science. Conversely, defense installations may provide unique opportunities for applied ecological research. A workshop on the needs and opportunities for Management Scale Ecosystem Research was conducted during the Spring of 1997. The workshop was considered a success by all measures.

Much of the success can be attributed to the foundation efforts of select members of the SAB. The workshop convened a prestigious group of ecologists and scientists from related disciplines, land managers, Federal researchers, and regulators to determine the areas of opportunities to conduct research in support of defense requirements. The results of this effort have provided a scientific foundation upon which to support research on detailed, specific requirements. A focused Statement of Need requesting proposals in the area of ecosystem monitoring will be issued in FY98 for a possible FY99 new start. All efforts will be fully coordinated with the recently initiated U.S. Army's Land Management System research program and fully supported by the DoD and DOE land use managers.

In a desire to capitalize on the success of the Ecosystem Management Research Workshop, the members deliberated on other opportunities to reap similar successes in the other technical Thrust Areas. Board members suggested an initiative to help focus research efforts on high potential payoff opportunities in the cleanup area, such as alternative endpoints for remediation. A Cleanup Workshop was proposed to address research into environmentally acceptable endpoints for remediation at military sites. In cooperation with the SERDP staff, the Cleanup subcommittee developed an outline for the workshop that included the participation of the American Academy of Environmental Engineers. This workshop is planned for early summer 1998; members of the SAB are actively involved in the planning and execution of the workshop.

Emphasis on Quality and Relevance

The Board's strategic vision was coupled with a continued focus on achieving world-class quality research. Much of the SAB's strategy session time concentrated not only on SERDP's strategic vision, but also on how to maintain and improve the relevance and quality of research and the resultant products. From the outset of the fiscal year, the SAB supported the Executive Director in the development of the FY 1998 Program, specifically with regard to the solicitation/evaluation process that:

- embraces the widest competition possible through the introduction of direct participation of non-Federal research capabilities;
- increases the use of outside peer review for the technical evaluation of proposals and the conduct of projects; and
- emphasizes the leveraging of Federal participant and private partner capabilities.

The SAB fully supported the Executive Director's solicitation of competitive proposals by academic institutions and private industry through a Broad Agency Announcement. In general, the SAB was pleased with the results of the solicitation and the proposals submitted in response to the 12 Statements of Need that were available to non-Federal proposers.

Peer review is considered by the SAB to be an integral part of any credible evaluation process. As such, the SAB was pleased with the peer review procedures established by SERDP and

endorsed the process for future years. The Board strongly recommended that they be provided the opportunity to submit names of qualified experts that could be used as candidates for peer reviewers. The Executive Director heartily embraced this advice and welcomed all nominations for consideration.

In a related matter, the Board also endorsed the implementation of Technical Advisory Committees (TACs) to monitor and advise performers routinely on technical progress and direction of more complex, multi-faceted 'umbrella' projects, such as CU-720: Integrated Biotreatment Research Program - From Flask to Field and PP-1059: The Next Generation Fire Suppression Technology Program. Recognizing that the SAB is subject to only a small sampling of the technical details and efforts of these complex projects on a yearly basis, they encouraged this approach to ensure technical quality, relevance, and focus. Interested members of the appropriate subcommittees attended TAC meetings and fully supported TAC recommendations.

In their attempts to ensure that research is relevant and focused, Board members increased their interest in the role of the Services and eventual users of the technology being developed.

"The SAB considers technology transfer of paramount importance. As one of the basic keys to SERDP's success, continued emphasis on the transfer of technology among the DoD, DOE, EPA, other Federal organizations, and the private sector is essential to a successful and robust R&D program."

Frequently, Principal Investigators were questioned on the purpose, intent, and use of their technology, as well as the responsibility of the user with regard to cooperative funding of the project. The SAB considered 'single-user' technologies as inappropriate for SERDP funding, unless the problem being addressed required a critical mass of resources, both funding and technical, that could not be provided by that one organization. Under these special circumstances, the beneficiaries of SERDP-developed technology were expected to contribute leveraged funding and/or in-kind support that demonstrated their clear intent to facilitate transition of a successful technology and fund further development efforts.

While acknowledging the central role of the prioritized defense environmental requirements published by the Office of the Under Secretary of Defense for Environmental Security, the SAB members exhibited a sincere desire to become involved with the process to identify, select, and articulate those requirements that would be appropriate for SERDP funding. In this regard, the SAB recommended that they be included early in the process to develop Statements of Need, more so than just during the final review of the Statements of Need. In this manner, the Board could influence the direction of SERDP research to focus on opportunities that are considered 'strategic' in nature, as defined previously.

Areas of Opportunity

Consistent with past practice, the Executive Director solicited the advice of the SAB regarding his proposed allocation of funds for the coming year, in this case, the FY 1998 Program. Board members deliberated the merits of the proposed allocations and concluded the following:

- agreed with the general trends of investment within each of the four Thrust Areas;
- although they agreed that Cleanup should decline over the course of the next few years, it should decline at a lesser rate than proposed by the Executive Director;
- similarly, while in agreement that Pollution Prevention is the way of the future, the level of investment should not increase at the proposed rate; and
- investments in Conservation can result in quality opportunities for research and potentially high returns.

Accordingly, the SAB recommended a modified investment strategy that supported a modest increase in Pollution Prevention investment at the expense of a modest decrease in Cleanup investment.

Project Recommendations

The SAB reviewed 54 proposals for 36 new projects and 18 ongoing projects, totaling \$4.78 million in FY97 funding requests and \$34.25 million for FY98 (Table 2). The Board recommended against funding 2 projects totaling \$2.5 million in FY97 funding requests and 8 projects requesting a total of \$3.47 million for FY98. CU-368, CU-1080, and CP-1078 were recommended for only a portion of the funding amount requested. Three projects (PP-063, PP-158, PP-1042) were presented to provide informational updates to the Board and did not involve a funding recommendation. In addition, the Board was briefed on two Congressional earmark projects which were funded by SERDP in FY97: National Environmental Education and Training Center (CP-819) and Insensitive Munitions (PP-1072). The Board recommended against funding either project. A summary of all projects reviewed and the corresponding SAB comments and recommendations is provided in Appendix B.

Thrust Area	Number of Projects Reviewed			Funding Recommendation	
	Ongoing	New Start	Total	Fund	Do Not Fund
Cleanup	5	12	17	15	2
Compliance	2	8	10	8	2
Conservation	2	7	9	8	1
Pollution Prevention	9	9	18*	10	5
TOTAL	18	36	54*	41	10

*Three projects provided only an informational update and did not require a funding recommendation

Table 2 - Summary of Proposals Reviewed by Thrust Area

APPENDIX A

FY97 SAB MEMBERSHIP

Weber, Walter J., Jr., SAB Chair

- Current Position:** The Gordon M. Fair and Earnest Boyce Distinguished University Professor; Director, the Great Lakes and Mid-Atlantic Center for Hazardous Substance Research; Executive Director, the National Center for Integrated Bioremediation Research and Development, University of Michigan.
- Degree(s):** Ph.D., Environmental and Water Resources Engineering, Harvard University, 1962; A.M., Environmental Chemistry, Harvard University, 1961; M.S.E., Environmental Engineering, Rutgers University, 1959; Sc.B., Chemical Engineering, Brown University, 1956.
- Previous Positions:** Chairman, University Program in Water Resources, University of Michigan, 1968-1992; Visiting Professor, University of California at Berkeley and University of Melbourne, Australia, 1971.
- Professional Activities:** Member, National Academy of Engineering; Diplomate, American Academy of Environmental Engineers; Member of several National Research Council committees and boards and a number of academic, government, and industrial advisory committees; Member and active participant in the American Chemical Society, American Institute of Chemical Engineers, Association of Environmental Engineering Professors, American Society of Civil Engineers (Fellow), American Water Works Association (Fellow), International Association for Water Quality, and the Water Environment Federation.
- Awards:** Athalie Richardson Irvine Clarke Prize for Outstanding Achievement in Water Science and Technology, National Water Research Institute, 1996; The Gordon Maskew Fair Award, American Academy of Environmental Engineers, 1995; Dist. University Professorship, University of Michigan, since 1994; Dist. College Professor, University of Michigan, 1987-1994; Dist. Scientist Award, U.S. EPA, 1991; Dist. Faculty Award, State of Michigan, 1989; Stephen S. Atwood Award for Engineering Excellence, University of Michigan, 1987.
- Publications:** Three books and approximately 300 peer-reviewed technical publications.

Eno, Amos S., SAB Vice-Chair

Current Position: Executive Director, National Fish and Wildlife Foundation, Washington, DC.

Degree(s): M.A., Cornell University, 1977; B.A., Princeton University, 1972.

Previous Positions: Director, Conservation Programs, National Fish and Wildlife Foundation; Director, Wildlife Programs, National Audubon Society; Special Assistant to the Chief, Office of Endangered Species, U.S. Fish and Wildlife Service; Special Assistant to Assistant Secretary of the Interior for Fish, Wildlife, and Parks.

Professional Activities: Consultant/Production Assistant to National Audubon Society's TV specials and to WTBS for wildlife films; Consultant to President's Commission for Americans Outdoors; North American Wetlands Council; Director, North Atlantic Salmon Fund; Advisor WNET New York, "Nature's Trail."

Awards: Frederick Douglas Prize, Princeton University, 1972; Chevron Conservation Award, 1992.

Publications: FY89-96 (annual) Federal Agency Needs Assessments, four Audubon Wildlife Reports, and Crossroads: Environmental Priorities for the Future; Co-Author, Wolf Recovery in the Northern Rocky Mountains.

Bierbaum, Rosina M., Represents Assistant to the President for Science and Technology

- Current Position:** Acting Director for Environment, Environmental Division, Office of Science and Technology Policy, Executive Office of the President.
- Degree(s):** Ph.D., Ecology & Evolutionary Biology, State University of New York (SUNY) at Stony Brook; B.A., English and B.S., Biology, Boston College.
- Previous Positions:** Assistant Director for Environment, Office of Science & Technology Policy (OSTP); Senior Analyst, OSTP; Senior Associate, Office of Technology Assessment (OTA); Project Director for Climate Change, OTA; Assistant Project Director for Acid Rain, OTA; Congressional Fellow, OTA; Editorial Fellow, *The Quarterly Review of Biology*; Research Assistant, SUNY, Stony Brook.
- Professional Activities:** American Association for the Advancement of Science, Ecological Society of America, Sigma Xi; Editorial Board Consequences; National Science & Technology Council (NSTC) liaison to U.S. Global Change Research Program; Chair, Committee on Environment & Natural Resources, NSTC; Acting Chair, Environmental Monitoring Initiative Committee on Environmental & Natural Resources (CENR); Member, White House Ecosystem Management Implementation Task Force.
- Awards:** Distinguished Alumni Award, SUNY at Stony Brook, 1996; received OSTP Merit Awards 1995, 1994; awarded OTA's highest honor--Senior Associate, 1991; elected member Sigma Xi, 1985; Congressional Fellowship, 1980.
- Publications:** Primary Author of *Changing by Degree: Steps to Reduce Greenhouse Gases*, 1991; *Preparing for an Uncertain Climate*, 1993; Contributor to nine assessments on environmental issues published by OTA; co-authored and published numerous articles in technical and popular journals; testified before both House and Senate on environmental issues.

Carpenter, Richard A.

- Current Position:** Environmental Consultant, Charlottesville, Virginia.
- Degree(s):** M.S., Organic Chemistry, University of Missouri, 1949; B.S., Chemistry, University of Missouri, 1948.
- Previous Positions:** Consultant to United Nations, World Bank, Asian Development Bank, 1980-present; Senior Fellow, East-West Center, Honolulu, Hawaii, 1977-1993; Executive Director, Commission on Natural Resources, U.S. National Research Council, 1972-1977; Founder and Chief, Environmental Policy Division, Congressional Research Service, Library of Congress, 1964-1972; Research for Callery Chemical Company (1958-1964), Midwest Research Institute (1951-1958), and Shell Oil Company (1949-1951).
- Professional Activities:** Currently member of Editorial Advisory Board, EIA Review, 1985-present; Co-Founder and Chairman of the Board (1991), Pacific Basin Consortium for Hazardous Waste Research; Study Director, Hawaiian Environmental Risk Ranking project, 1991-1992.
- Awards:** The Private Conservation Award, Virginia Chapter of The Nature Conservancy for Ecological Risk Assessment of Clinch Valley Bioreserve, 1996; elected full member of Sigma Xi, the Scientific Research Society, University of Missouri, 1949.
- Publications:** Several books, many professional papers, and patentee.

Conway, Richard A.

Current Position: Environmental Consultant.

Degree(s): M.S., Environmental Engineering, MIT, 1957; B.S., Public Health, University of Massachusetts - Amherst, 1953.

Previous Positions: Senior Corporate Fellow, Corporate Fellow, Development Associate, Group Leader, and Development Engineer, Union Carbide Corporation, 1957-1997.

Professional Activities: Member, National Academy of Engineering; Consultant and former Chair of Environmental Engineering Committee, Science Advisory Board, Environmental Protection Agency; Member, Board on Army Science and Technology and several study committees, National Research Council; Diplomate, American Academy of Environmental Engineers; Fellow, American Society of Civil Engineers; Member, Advisory Committees to several university research centers; Registered Professional Engineer.

Awards: Rachel Carson Award, Society of Environmental Chemistry and Toxicology, 1998; Award for Personal Achievement in Chemical Engineering, *Chemical Engineering*, 1986; Dudley Medal, ASTM, 1984; Rudolfs Award, Water Environment Federation, 1974 & 1983; State-of-the-Art Civil Engineering Award, American Society of Civil Engineers, 1975; Hering Award, American Society of Civil Engineers, 1974; Gascoigne Award, Water Environment Federation, 1967.

Publications: One book, Editor/Co-Editor of 8 books, 21 refereed publications (numerous others), and three U.S. patents.

Loehr, Raymond C.

- Current Position:** Hussein M. Alharthy Centennial Chair and Professor of Civil Engineering, The University of Texas at Austin.
- Degree(s):** Ph.D., Sanitary Engineering, University of Wisconsin, 1961; M.S., Civil Engineering, Case Institute of Technology, 1956; B.S., Civil Engineering, Case Institute of Technology, 1953.
- Previous Positions:** Liberty Hyde Bailey Professor of Engineering, Cornell University; Professor, Cornell University -- joint appointment, Department of Agricultural Engineering and Department of Environmental Engineering; Senior Program Manager, Hazardous Wastes, Environmental Research and Technology, Inc.; Director, Environmental Studies Program, College of Agriculture and Life Sciences, Cornell University; Program Advisor, Effluent Guidelines Division, U.S. Environmental Protection Agency, Washington, DC; Associate Professor and Professor, University of Kansas; Instructor and Assistant Professor, Case Institute of Technology.
- Professional Activities:** National Academy of Sciences, National Academy of Engineering, National Research Council Committees; Environmental Protection Agency, Chair Executive Committee, Science Advisory Board; International Joint Commission, Science Advisory Board Committee, Phosphorous Management Strategies Task Force.
- Awards:** Member, National Academy of Engineering, 1983 to present; Thomas R. Camp Medal, Water Environment Federation, 1997; Gordon M. Fair Award, American Academy of Environmental Engineering, 1996; Rachel Carson Award, Society of Environmental Toxicology and Chemistry, 1995; T.H. Feng Distinguished Lecturer in Environmental Engineering, University of Massachusetts, Amherst, Mass., 1994; Thomas R. Camp Lecture Award, Boston Society of Civil Engineers, American Society of Civil Engineers, 1992; Joe J. King Professional Achievement Award, The University of Texas at Austin, 1992; Billy and Claude Hocott Distinguished Centennial Engineering Research Award, The University of Texas, 1991; G. Brooks Earnest Lecture Award, Cleveland Section, American Society of Civil Engineers, 1991; Engineering Foundation Faculty Excellence Award, The University of Texas at Austin, 1987; Senior Fulbright-Hays Scholar, New Zealand, 1979; Rudolph Hering Medal, American Society of Civil Engineers, 1969; Water Conservationist of the Year, Kansas Wildlife Federation, 1967.
- Publications:** More than 220 technical publications since 1974.
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Moss, Marvin K.

Current Position: Provost, Vice Chancellor for Academic Affairs, and Professor of Physics, The University of North Carolina at Wilmington, 1992-present.

Degree(s): Ph.D., Physics, North Carolina State University, 1961; M.S., Nuclear Engineering, North Carolina State University, 1957; B.S., Math and Physics, Elon College, 1955.

Previous Positions: Associate Vice-Chancellor for Marine Sciences, University of California, San Diego, and Deputy Director, Scripps Institution of Oceanography (1987-1992); Director and Technical Director, Office of Naval Research (1982-1987); Associate Director, Office of Energy Research, U.S. Department of Energy (1979-1982); Director, Nuclear Division, U.S. Arms Control and Disarmament Agency (1976-1978); Professor of Physics, North Carolina State University (1961-1977).

Professional Activities: Executive Committee, International Ocean Drilling Program; Member, American Association for the Advancement of Science; Member, American Geophysical Union; Member, University of North Carolina Marine Science Advisory Board; Member, Board of Governors, Consortium for Oceanographic Research and Education (CORE).

Awards: Atomic Energy Commission Fellow during graduate study; NSF Post-Doctoral Fellow, Tait Institute of Mathematical Physics, University of Edinburgh, and Imperial College, University of London; Distinguished Alumni, Elon College, 1979; Presidential Rank Government Executive, 1985; U.S. Navy Distinguished Civilian Service Award, 1987.

Publications: Author of numerous research papers, reports, and successful grants.

Parker, Frank L.

- Current Position:** Distinguished Professor of Environmental and Water Resources Engineering, Vanderbilt University.
- Degree(s):** Ph.D., Harvard University, 1955.
- Previous Positions:** Head, Radioactive Waste Disposal Research - International Atomic Energy Agency; Head, Radioactive Waste Disposal Research - Oak Ridge National Laboratory; Professor of Management of Technology, Vanderbilt University; Senior Research Associate, Vanderbilt Institute of Public Policy Studies.
- Professional Activities:** Member, National Academy of Engineering; Advisory Committees: Pennsylvania Power and Light Company, Oak Ridge National Laboratory, Bechtel Hanford, National Institute for Environmental Renewal, Medical University of South Carolina, Sandia National Laboratory, Environmental Protection Agency; Chair, International Atomic Energy Agency's (IAEA) Seminar on International Cooperation on Nuclear Waste Management in the Russian Federation; Plenary Speaker IAEA seminar on Safe Waste Disposal and NATO Seminar on Risk Management Strategies applied to Environmental Cleanup in Central and Eastern Europe.
- Awards:** Senior Research Fellow, International Institute Applied Systems Analysis; Harvie Branscomb Distinguished Professor 1994-1995; Alexander Heard Distinguished Service Professor, 1988-1989; Senior Research Fellow, The Beijer Institute, The Royal Swedish Academy of Sciences, 1984-1987.
- Publications:** Three books, Co-Editor of two books, Author or Co-Author of 25 book chapters and 50 journal articles.

Ryan, Michael J.

Current Position: Manager of Technology, Bechtel Environmental, Inc.

Degree(s): Ph.D., Environmental Engineering, University of North Carolina, 1975.

Previous Positions: Senior Vice President, Metcalf & Eddy Inc.; Executive Vice-President, ICF Technology Inc.; Chief of Environmental Policy, U.S. Air Force (USAF) (Pentagon); Director of Environmental Engineering and Industrial Hygiene, HQ Strategic Air Command; Director, Environics R&D Program, AFESC.

Professional Activities: Consultant to the USAF Surgeon General; Member, USAF Engineering and Services "Future Vision" Panel; Professional Engineer (Texas); Board Certified Industrial Hygienist; Diplomate to American Academy of Environmental Engineers.

Awards: U.S. Patent on filtration.

Publications: Seventeen articles or other publications since 1985.

Shreeve, Jean'ne M.

- Current Position:** Vice President for Research/Graduate Studies and Professor of Chemistry, University of Idaho.
- Degree(s):** Post Ph.D., University of Cambridge, England, 1967-1968; Ph.D., Inorganic Chemistry, University of Washington, 1961; M.S., Analytical Chemistry, University of Minnesota, 1956; B.A., Chemistry, University of Montana, 1953.
- Previous Positions:** Professor and Head, Department of Chemistry, University of Idaho, 1973-1987; Assistant Professor of Chemistry, University of Washington, 1962.
- Professional Activities:** Visiting Committee, Naval Research Advisory Committee, Office of Naval Research, 1995; Council for Chemical Research Governing Board, 1995-1997; University of Chicago Board of Governors of Argonne National Laboratory, 1992-1998; Board of Directors, American Association for the Advancement of Science, 1991-1995; Idaho Research Foundation, 1987-1999; Board of Directors, American Chemical Society, 1985-1993; EPSCoR, Idaho State Project Director, 1989-1999; National Science Foundation Advisory Committee for Chemistry, 1978-1982; Air Force Office of Scientific Research Proposal Evaluation Panel, 1972-1975.
- Awards:** Corresponding Member, Göttingen (Germany) Academy of Sciences, 1996; Harry and Carol Mosher Award, Santa Clara Valley Section (ACS), 1992; Honorary Doctor of Science, University of Montana, 1982; Alexander von Humboldt Foundation U.S. Scientist Award, Göttingen, 1978; American Chemical Society Award for Creative Work in Fluorine Chemistry, 1978; American Chemical Society Garvan Medal, 1972; Alfred P. Sloan Foundation Fellow, 1970-1972; Outstanding Achievement Award, University of Minnesota, 1970; National Science Foundation Postdoctoral Fellowship at Cambridge, 1967-68; U.S. Honorary Ramsay Fellowship, 1967-1968.
- Publications:** Author of over 290 scientific publications.

Thomas, Lydia W.

Current Position: President and Chief Executive Officer, Mitretek Systems, Inc.

Degree(s): Ph.D., Cytology, Howard University, 1973; M.S., Microbiology, American University, 1971; B.S., Zoology, Howard University, 1965.

Previous Positions: Senior Vice President and General Manager, Center for Environment, Resource and Space, Mitretek Systems, Inc., 1989-1996.

Professional Activities: American Association for the Advancement of Science; American Society of Toxicology; American Defense Preparedness Association; American Institute of Aeronautics and Astronautics/Public Policy; American Management Association; The Conference Board; National Energy Resources Organization; Sigma Xi Steering Committee; Teratology Society; Superintendent's Business/Industry Advisory Council for Fairfax County Public Schools; United States Energy Association; Serves on the Board of Directors of Cabot Corporation and Advisory Boards of INFORM and George Washington University's Virginia Campus; Corporate Member of the Charles Stark Draper Laboratory, Inc.

Awards: Dean's Award at the Black Engineer of the Year Conference, 1991; "Ebony" Image Award presented by The Coalition of 100 Black Women, Northern Virginia Chapter, for outstanding achievement in the public service, 1990; TWIN Award (Tribute to Women in International Industry) presented by the Young Women's Christian Association, National Board, 1986.

Publications: Co-Authoring one book and has written many technical reports -- the most recent printed in FIRST Magazine, Volume 9, Number 3 in 1996, titled "Future World Energy Demand."

Wetterhahn, Karen E.

- Most Recent Position:** Albert Bradley Third Century Professor in the Sciences, Professor of Chemistry, Dartmouth College.
- Degree(s):** Ph.D., Inorganic Chemistry and Physical Biochemistry, Columbia University, 1975.
- Previous Positions:** Visiting Scientist with S. J. Lippard, Department of Chemistry, MIT; Visiting Scholar with G. L. Verdine, Department of Chemistry, Harvard University; Acting Dean of the Faculty, Arts and Sciences, Dartmouth College; Associate Dean of the Faculty for the Sciences, Dartmouth College; Dean of Graduate Studies, Dartmouth College.
- Professional Activities:** American Chemical Society, Editorial Advisory Board: Chemical Research in Toxicology (1995-97 and 1986-90), Inorganic Chemistry (1994-96); John Wiley and Sons, Editorial Advisory Board: International Journal of Chemical Kinetics (1995-97); Treasurer, Women in Cancer Research (1994-96).
- Awards:** Alumni Citation in Science and Education, St. Lawrence University, 1989; Alfred P. Sloan Fellow, 1981-85; Hammett Award in Chemistry, Columbia University, 1975.
- Publications:** Author of over 90 publications including referenced articles and book reviews.

Winokur, Robert S., Represents Administrator, NOAA

Current Position: Assistant Administrator, Satellite and Information Services, National Oceanic and Atmospheric Administration, Department of Commerce.

Degree(s): M.S., American University; B.S., Rensselaer Polytechnic Institute.

Previous Positions: Technical Director, Office of the Oceanographer of the Navy; Senior Civilian Technical Manager, Navy Operational Oceanography Program; Associate Technical Director, Ocean Science and International Programs, Office of Naval Research; Director, Planning and Assessment, Office of Naval Research; Deputy and Special Advisor, Office of the Deputy Assistant Secretary of the Navy for Antisubmarine Warfare; Special Assistant for Acoustics to the Director, Antisubmarine Warfare and Surveillance Programs, Office of the Chief of Naval Operations; Branch Head and Division Director, Naval Oceanographic Office.

Professional Activities: Fellow, Acoustical Society of America; Former Vice President Technical Affairs, Marine Technology Society.

Awards: Presidential Distinguished Executive and Meritorious Rank Awards for Senior Executives.

Publications: Numerous papers and reports on underwater acoustics and Naval oceanography.

Wood, Randolph

Current Position: Director, Nebraska Department of Environmental Quality.

Degree(s): M.S., Engineering, Southern Methodist University; B.S., Engineering, University of Texas.

Previous Positions: Director, Arizona Department of Environmental Quality; Director, Wyoming Department of Environmental Quality; Supervisor, Source Testing Section, Texas Air Control Board; Engineer, General Dynamics Corporation.

Professional Activities: President, STAPPA (organization of Air Pollution Control Administrators); Board of Directors, STAPPA; Executive Secretary, Wyoming Governor's Acid Rain Coordinating Committee; Editorial Advisory Board, The Environmental Forum.

Awards: Tribute of Appreciation Award from EPA Administrator for air pollution control efforts, 1984; Citizen Participation Award from EPA Administrator for air pollution control efforts, 1980.

APPENDIX B

SAB PROJECT ACTIONS DURING FY97

TITLE/PERFORMER/ REQUESTED FUNDING	SUMMARY	RECOMMENDATION
CLEANUP		
<p>CU-368: Aquifer Restoration by Enhanced Source Removal</p> <p>(USEPA: National Risk Management Research Lab)</p> <p>\$2,480K (FY98)</p>	<p>The goal of this continuing project is to provide field demonstrations of innovative processes to remediate aquifers contaminated by non-aqueous phase liquids (NAPLs) including fuels, solvents, and other organic contaminants in a timely and cost-effective manner. Low-solubility organics, such as chlorinated solvents, were used and released to the environment in massive quantities during the 1950's, 60's and 70's. These contaminants have migrated through the subsurface and have entered groundwater at more than 2000 DoD sites. The project, initially funded by SERDP in FY93, intends to continue efforts planned through demonstrating (in the field at Dover AFB) the effectiveness of emerging DNAPL source removal technologies using side by side comparisons in controlled experiments and to compare the performance of each to "pump and treat" technology.</p>	<p>(April) The Board expressed concern that all the results from the earlier Light Non-Aqueous Phase Liquid (LNAPL) portion of the project had not been included in the decisions made to conduct the Dense Non-Aqueous Phase Liquid (DNAPL) tests. Specifically, the Board questioned the proposed use of air sparging and vapor extraction for removal of DNAPL. Questioning the likelihood of gaining regulatory approval for such a process, the Board members noted that rather than volatilizing the contaminants, air sparging would mobilize the DNAPL and disperse the contaminants outward into the aquifer. The Board moved to recommend funding a reduced scope of the project for FY98 that excluded the planned air sparging and vapor extraction component of the project and concomitant withholding assigned funds (\$300K), as well as a re-examination by the PI of the complex sugar solubilization task. The reduced scope of the project for FY98 was approved by a vote of 9-0.</p>
<p>CU-720: Integrated Biotreatment Research Program</p> <p>(U.S. Army Waterways Experiment Station)</p> <p>\$2,600K (FY98)</p>	<p>This project represents a collective research initiative by several key governmental and academic organizations with a long history of developing treatment technologies. The ultimate goal of this continuing program is to perform research efforts that will result in the fielding of several biotreatment processes for remediation of predominant DoD contaminants. The proposed experimental approach will be first to investigate a variety of promising biotreatment techniques at the bench scale. During performance of bench activities, engineers with design and implementation experience will assess the overall implementation potential and projected costs associated with these techniques. Upon completion of the bench efforts, several small-scale pilot studies will be performed using those techniques considered most promising. After performance of the intermediate scale studies, at least four of the most economically and technically sound processes will be evaluated on the field pilot scale at actual DoD sites.</p>	<p>(June) This project, initially funded by SERDP in FY94, briefed the Board to continue to pursue its bioremediation research. To aid the Board in its review of this large umbrella project with a broad scope, SERDP required the briefing to include the Points of Contact (POCs) for each Focus Area within the Project: Polychlorinated Biphenyls (PCBs); explosives; the bioreactor work at Volunteer Army Ammunition Plant (VAAP); Polycyclic Aromatic Hydrocarbons (PAHs); and, chlorinated solvents. The Board inquired regarding the establishment of the Technical Advisory Committee (TAC) to provide the necessary downselect function to focus the future activities to be performed under the project. The PI identified the pending TAC Report as the key decision-making component of the project's future direction and indicated that the TAC Report was scheduled for completion at the end of July with copies to be provided to the Board members. The Board moved to recommend approval of this project as presented by a vote of 8-0 with 1 abstention (Dr. Weber).</p>
<p>CU-1043: Natural Attenuation of Explosives Contaminants</p> <p>(U.S. Army Waterways Experiment Station)</p> <p>\$900K (FY98)</p>	<p>The goal of this continuing project is to demonstrate tools for monitoring natural attenuation of explosives through both immobilization processes and microbial degradation processes. The project will develop the following four areas: microbial monitoring tools, stable isotope technology, site geological characterization, and modeling. Effective monitoring tools will be integrated into guidance for selection and implementation of natural attenuation as a remedial alternative. The payoff of this work is an estimated cleanup cost of \$30 per ton as compared to \$300 per ton using traditional "pump and treat" technologies. Results of this project will be integrated into and demonstrate natural attenuation of explosives.</p>	<p>(April) The Board raised concerns regarding the heavy reliance on the use of biomarkers and appropriate enzymes systems that indicate a high expectation of mineralization of explosives, as well as concerns that the project may overlook other pathways that would influence the fate of the explosives. The Board encouraged coordination with CU-720: Federal Integrated Biotreatment Research Consortium: Flask to Field Initiative. The Board requested a more formal interface and a clear definition of the coordination of SERDP projects that focus on explosives, such as CU-715, CU-720, and this project. The Board moved to approve FY98 funding for this project by a vote of 8-0.</p>

TITLE/PERFORMER/ REQUESTED FUNDING	SUMMARY	RECOMMENDATION
CU-1064: Bioenhanced In-Well Vapor Stripping to Treat Trichloroethylene (TCE) (Air Force Institute of Technology) \$560K (FY98)	The objective of this continuing project, that returned to provide an update of the design process, is to demonstrate that a combination of two in-situ treatment technologies, in-well vapor stripping and in-situ bioremediation, can be used to reduce and contain the high levels of dissolved TCE contamination found in the proximity of a non-aqueous phase liquid contaminated zone. The aim is to approach or obtain compliance with the exceedingly low regulatory standards established under the Safe Water Drinking Act. For this project, an in-well vapor stripper will be installed next to a TCE-contaminated "hot spot" and up gradient from a downflow biotreatment well. In operation, the in-well vapor stripper will use air-lift pumping to pump contaminated water from the lower portion of the aquifer to a screened interval above and below the water table to create a circulation zone within the aquifer. With 90-99% of the Volatile Organic Compounds (VOCs) stripped from the water to the gaseous phase, the treated water will leave the upper screen of the in-well vapor stripper and flow to the upper screen of the biotreatment well. This water will be pumped down through the well, where a primary substrate will be added. After the addition of the primary substrate, the water reenters the aquifer through the lower screen interval where indigenous microorganisms can aerobically metabolize the primary substrate and simultaneously cometabolize the residual chlorinated solvent.	(August) Board members raised questions concerning the implementation and operation of the proposed combination of two separate technologies to treat TCE in-situ, specifically regarding the economic feasibility and duration of remediation. The Board also raised questions regarding the model that was being developed to simulate the bioremediation conditions within the Dover AFB test cell, specifically noting boundary condition issues during the transition to a field application in 3-D from a computer model simulation that was essentially 2-D. Board members expressed some concerns regarding the overall benefit of the project in light of other available technologies to treat TCE. The Board voted 7-0 to recommend approval of the project.
CU-1070: Low Frequency, Ultra-Wideband Room Synthetic Aperture Radar for Remote Detection of Unexploded Ordnance (Army Research Lab) \$500K (FY97-New Start) \$700K (FY98)	Due to an extended review process, this project was not recommended by SERDP as an FY97 new start until after the fiscal year had begun. The project intends to: (1) determine the applicability of Ultra-Wideband (UWB) Synthetic Aperture Radar (SAR) for detecting and discriminating surface and subsurface UXO; (2) refine and validate electromagnetic models that can be used to extrapolate UWB SAR performance to other environmental conditions (soils); and (3) develop detection algorithms for separating UXO from clutter.	(April) The Board raised questions concerning the algorithms under development to support this project, as well as the impact of differing topography and soil type on the performance of the system and about environmental constraints. Board members suggested that this technology might be applicable to a range of wider applications, from the remediation of radioactive ranges through the detection of buried wastes, to which the PI agreed. The Board moved to approve funding for this project as presented and they discussed the requirement for coordination between this project and the other UXO FY97 new start, CU-1071: UXO Detection by Enhanced Harmonic Radar. The Board voted 9-0 to recommend approval of the project.

TITLE/PERFORMER/ REQUESTED FUNDING	SUMMARY	RECOMMENDATION
<p>CU-1071: UXO Detection by Enhanced Harmonic Radar (National Reconnaissance Office)</p> <p>\$460K (FY97-New Start) \$450K (FY98)</p>	<p>Due to an extended review process, this project was not recommended by SERDP as an FY97 new start until after the fiscal year had begun. The project intends to design, fabricate, and test a third-harmonic SAR radar to determine its efficiency in (a) detecting surface and buried mines of all sizes and types and (b) detecting surface and shallow-buried UXO. In addition, the radar also will have a capability to produce high resolution images showing locations.</p>	<p>(April) The Board raised concerns regarding the performance of any prior tests of the proposed system to acquire a response and depth limitation for the detection of UXO. The Board recommended that basic tests be conducted on imperfectly joined metals to determine the ability of the third harmonic to detect microscopic gaps in metal-to-metal joints in soil covered conditions. The Board moved to approve the project with the recommendation that feedback be provided to the SAB, particularly on the intensity of third-harmonic re-radiation. The motion included a recommendation that the PI provide preliminary evidence of successful initial tests, as well as having the initial funding of the project be limited to \$200K, and that results of the proof-of-concept tests should be presented to the Board at the September 1997 meeting. The Board also requested that the proof-of-concept test plan be provided. The project, with limitations, was approved for funding by a vote of 8-1.</p>
<p>CU-1073: Using Mode of Action to Assess Health Risk for Mixtures of Chemical/Physical Agents (DOE: Pacific Northwest National Lab)</p> <p>\$150K (FY97-New Start) \$410K (FY98)</p>	<p>Due to an extended review process, this project was not recommended by SERDP as an FY97 new start until after the fiscal year had begun. The project intends to: (1) conduct the research to provide the data required to assess the risks from mixtures of chlorinated solvents in hazardous waste sites and contaminated groundwater and (2) test the hypothesis that modes of action can be used to predict interactions between carcinogens.</p>	<p>(June) Board members opined that the work proposed seemed interesting, yet concerns persisted that the proposed work could be used for the purposes indicated in the brief. Opining that the project would benefit from additional oversight, the Board suggested that the project return to brief the Board next year to check progress and ensure the proper oversight was provided. The Board motioned to approve the project with the recommendation that the project return to brief the Board next year, regardless of funding level, and to ensure that the PI be provided a copy of the second round of peer review comments. The project was approved by a vote of 9-0.</p>
<p>CU-1080: Value-Added Site Monitoring & Infrastructure Maintenance for In-Situ Bioremediation (EPA: National Center for Integrated Bioremediation Research and Development)</p> <p>\$375K (FY97-New Start) \$395K (FY98)</p>	<p>Due to uncertainties with the budget and an extended review process, this project was not recommended by SERDP as an FY97 new start until well after the fiscal year had begun. The project intends to: (1) conduct serial monitoring of contaminant, geochemical constituents, and indicators of bioremediation at three actual sites of fuel and/or solvent contamination at the former Wurtsmith AFB near Oscoda, MI; (2) update and maintain the existing historical database on the progress of intrinsic (i.e., natural) bioremediation at these sites which extends from the late 1980's; and (3) analyze the impact of observed spatial and temporal variability in contaminant mass distributions on the reliability of estimates of rates of net mass removal (i.e., the progress of bioremediation) and projected timeframes for site closure.</p>	<p>(August) Board members raised several concerns regarding the proposed benefits of the monitoring work within the scope of the project, especially those applied to modeling improvements that appeared to be outside the scope of the project. Citing the lack of detailed project information in the presentation, Board members noted the difficulty in: (1) evaluating the merit of the proposed work and (2) comprehending fully the interaction between this project and the other modeling efforts. Consequently, the Board moved to approve FY97 funding for CU-1080, with the caveat that the project return at the January 1998 SAB meeting for approval of FY98 funding. The Board requested that the briefing: (1) provide an update on FY97 activities and progress; (2) give explicit details on the application component of the project, specifically addressing how the data collection would enhance modeling capability; and (3) identify the items/chemicals that will be monitored and why/where they will be monitored. The Board approved the motion with recommendations by a vote of 6-0 with 1 abstention (Dr. Weber).</p>

TITLE/PERFORMER/ REQUESTED FUNDING	SUMMARY	RECOMMENDATION
<p>CU-1081: Genosensor-Based Ecotoxicity Response Assessment</p> <p>(DOE: Oak Ridge National Lab)</p> <p>\$645K (FY98-New Start)</p>	<p>The objective of this proposed FY98 new start is to employ novel channel glass biosensor chips (genosensors) containing arrays of DNA probes, to characterize and monitor the response of soil microorganisms to exposure to genotoxic agents. In a "sequence-directed" approach, mRNA profiling will be carried out utilizing arrays of oligonucleotide probes corresponding to genes known to be induced by genotoxic exposure. In a universal "non-targeted" approach, a new genosensor-based arbitrary sequence oligonucleotide fingerprinting technique will be used to discover new genes displaying differential expression in cells exposed to military-relevant compounds present in explosives and fuels. These new sequences will be added to the repertoire of probes that are incorporated into genosensors for assessment of ecological responses.</p>	<p>(August) Board members raised questions concerning the construction and application of the proposed genosensor chips, specifically questioning the use of the genosensor technology to provide ecologically relevant and environmentally acceptable endpoints. Highlighting the apparent difficulty of the proposed genosensor extraction procedure, Board members noted that the extraction process appeared to be a limiting and key factor to the feasibility of the project. The Board suggested that the project was not acceptable from a cost benefit standpoint, noting that similar sampling and analysis in the laboratory were presently available. With some members voicing concerns over the cost benefit and feasibility of the project, the Board moved to recommend approval with the recommendation that the PI focus initial efforts of the project to demonstrate feasibility of the genosensor extraction process and present the results in a rebrief to the Board in FY98 before release of FY99 funds. The Board approved the motion with recommendations by a vote of 6-1.</p>
<p>CU-1089: Negative Ion Sensors for Real-Time Downhole DNAPLs Detection</p> <p>(Dakota Technology)</p> <p>\$355K (FY98-New Start)</p>	<p>The objective of this proposed FY98 new start is to investigate two possible applications of extremely promising negative ion chemistry for gas-phase detection of chloride ions generated from target DNAPL contaminants: (1) Thermionic Ionization Sources and (2) Downhole Electron Capture Detector with Photoemissive Source. The sensor/detector combination that is most sensitive, specific, and durable for downhole operation would be optimized. Whichever system is selected will utilize the commercially available, heated Geoprobe Membrane Interface Probe to separate chlorinated VOCs from soil and pore water for presentation to the downhole detector. A prototype is proposed to be built, laboratory tested, and validated in field tests.</p>	<p>(September) The Board raised issues regarding integration and transition of the sensor development technology to another SERDP supported project, SCAPS (Site Characterization and Analysis Penetrometer System). The PI and the SERDP Program Manager for Cleanup assured the Board that the screening tool developed as part of this project will transition to the SCAPS program. Board members asked about the proposed membranes intended for use in the negative ion sensor to ensure that the project researchers did not perform membrane development research, but rather characterize the performance of membranes under the unique applications of the project. The Board moved to approve FY98 funding for the project, and the motion was approved by a vote of 9-1.</p>

TITLE/PERFORMER/ REQUESTED FUNDING	SUMMARY	RECOMMENDATION
<p>CU-1090: Integrated Geophysical Multi-Sensor Detection of DNAPL Source Zone Identification</p> <p>(Blackhawk Geometrics)</p> <p>\$345K (FY98-New Start)</p>	<p>The objective of this proposed FY98 new start is to obtain the maximum information on the geological environment using computational geophysics and statistical data interpretation to combine seismic and electrical techniques which will extend 2D capabilities to high resolution 3D. Sensors will be placed first at the ground surface, and then subsurface in existing monitoring wells and/or temporary minimally invasive cone penetrometer (CPT) borings in order to delineate the geological pathways for DNAPL migration. Complementary direct imaging of DNAPL distribution will be provided by induced polarization (IP) crosshole tomography using the same downhole electrical sensors.</p>	<p>(September) The Board raised several concerns regarding the project's technical approach and lack of adequate preliminary data, directly influencing the overall probability of project success. Board members expressed serious concerns regarding the underlying hypothesis that the location of subsurface DNAPL can be inferred from knowledge of the subsurface stratigraphy. Citing specific reservations about the capability of the IP sensor to detect residual DNAPLs at the low level which are of interest to the environmental restoration community, Board members noted the lack of relevant data on the sensitivity of the IP technique in the presentation that could be an indicator of the probability of project success. Based on concerns with the project's lack of support of its primary hypothesis, the Board recommended that the PI collect representative, preliminary, laboratory-based data demonstrating the ability of the proposed techniques to detect DNAPLs at the level of concern, and return with this data to rebrief the Board. Based on the reservations voiced, the Board moved to reject the proposal without prejudice and included the recommendation that the project be rebriefed and that the rebrief should: (1) include experimental data on the detection sensitivity of the IP method that would support the hypothesis and (2) present an experimental plan to demonstrate the efficacy of the IP approach under real world conditions. The Board voted 10-0 to reject the project.</p>
<p>CU-1091: Innovative Seismic System for Buried Unexploded Ordnance Detection and Classification</p> <p>(BBN Technologies)</p> <p>\$600K (FY98-New Start)</p>	<p>The objective of this proposed FY98 new start is to: (1) perform both an initial feasibility study using short wavelength shear waves to determine acquisition and processing requirements and a system simulation incorporating seismic measurements and modeling that will be developed to analyze detection performance and clutter discrimination; (2) engineer a proof-of-concept Seismic Ordnance Detection System (SODS) including all critical components and technologies for testing; and (3) evaluate system performance and multisensor data fusion for improved discrimination and classification of buried objects in controlled testing using UXO simulants.</p>	<p>(September) The Board raised some questions on the mode of application and identified some of the limitations of the proposed seismic detection systems to which the briefer conceded that the seismic detection system would not be a stand alone system for complete detection and discrimination of all types of UXO. Board members inquired regarding the potential use of the acoustic sensors in applications outside the proposed scope of the project and were reassured that the seismic detection system would detect differing mechanical properties and that the suggested applications would be feasible. The Board moved to recommend approval of the project as presented, and the motion was approved by a vote of 7-0.</p>

TITLE/PERFORMER/ REQUESTED FUNDING	SUMMARY	RECOMMENDATION
<p>CU-1092: Model-Based Data Fusion and Discrimination of UXO in Magnetometry and EM Surveys</p> <p>(Naval Research Lab)</p> <p>\$480K (FY98-New Start)</p>	<p>The objective of this proposed FY98 new start is to develop data fusion techniques for the best available existing sensor suites to provide better discrimination between ordnance and clutter using arrays of full-field magnetometers and time-domain electromagnetic (EM) sensors as the primary detection tools. The project would entail five phases: (1) development of detection algorithm including enhancement of principal-component transform software for automatic target detection and processing of multisensor data; (2) continued modeling, calibration, and regression development for the magnetic and EM sensors and formulation of the joint inverse problem (model fusion); (3) formulation, training, and testing of a probabilistic classifier used in data fusion; (4) system integration, shakedown of all components, and integration with a graphic user interface, focusing on automatic vs. manual target picking and individual vs. joint inversion of data from different sensors; and (5) field demonstration at a prepared site containing documented ordnance and typical clutter.</p>	<p>(September) The Board expressed some reservations regarding the expected project accomplishments, due to the level of data interpretation involved. Board members cautioned that the expectations for success may be too high when considering the many variables within the scope of investigation under the project. While acknowledging support for the proposed research, the Board voiced concerns that the results of the project may not provide as much of an analytical tool as proposed. Replying to these concerns, the PI and the Director of ESTCP expressed the belief in the project's success, stating that the quality and cleanliness of data sets currently available are much improved from the data sets originally available for analysis. Voicing their conviction that a combination of the proposed data fusion work with that of other UXO efforts could lead to good technologies, the Board moved to recommend approval of the project as presented, approving the motion by a vote of 7-0.</p>
<p>CU-1093: In-Situ Clay Formation: A New Technology for Stable Containment Barriers</p> <p>(DOE: Sandia National Lab)</p> <p>\$270K (FY98-New Start)</p>	<p>The objective of this proposed FY98 new start is to develop a new type of containment barrier by precipitating clays in-situ in porous geological materials. The project's technical objectives are to: (1) confirm published results suggesting that clays can be precipitated from aqueous gels in a few weeks to months; (2) design an optimum composition of aqueous gel solution for maximum clay yield and crystallization rate, while maintaining injectability into porous soils and sediments; and (3) test the method in "sandbox" experiments in the laboratory to obtain a significant reduction in permeability and increase in geomechanical stability, prior to a field test.</p>	<p>(September) While supporting the proposed goals, Board members remarked that the preliminary supporting data was lacking to support the hypothesis and technical approach, stating that supporting preliminary data was key in assessing the probability of project success. Citing the proposed work as an interesting concept, other Board members expressed confidence in the work and characterized it as a fairly basic (6.1) research project, adding that a decision on the go/no-go decision point would be appropriate at the end of year one and should be based on the data collected up to that point.</p> <p>Raising some issues with the chemistry of the gels proposed for use, Board members expressed concern about unknown viscosity parameters of the gels and their effects during scale-up of the proposed containment system, specifically the issue of heavy hydraulic head buildup. With consideration of the concerns voiced, the Board moved to recommend approval for the first year of project funding, with the requirement that the project rebrief the SAB prior to the third year of work. The motion was amended to include the recommendations that: (1) SERDP staff conduct a detailed review at the May 1998 SERDP IPR, with particular emphasis on the quality and usefulness of the preliminary data; and (2) the project rebrief the SAB at the end of the first and second year of work to assess the progress of the project. The motion, with the requirements, was seconded and approved by a vote of 9-1.</p>

TITLE/PERFORMER/ REQUESTED FUNDING	SUMMARY	RECOMMENDATION
<p>CU-1094: Environmental Impacts to the Chemical Signature Emanating from Shallow UXO</p> <p>(DOE: Sandia National Lab)</p> <p>\$200K (FY98-New Start)</p>	<p>The objective of this proposed FY98 new start is to investigate the fate, transport, and distribution of the chemical signature escaping from shallow buried UXO [focusing on Trinitrotoluene (TNT) and Research Developed Explosive (RDX)] in order to develop sampling system designs and operational strategies for chemical detector platforms that could be used for broad categories of buried UXO. Concurrent work will be performed in four major thrust areas: (1) numerical and analytical model development/utilization to iterate and explore the sensitivities of individual and interacting environmental parameters; (2) fundamental measurements of physical/chemical/biological properties of target explosive components to fill data gaps required by the model; (3) laboratory-scale flux measurements in a volatilization chamber of the most persistent target explosive to validate portions of the model; and (4) field survey under optimal and difficult conditions to devise an operational strategy that makes use of optimum environmental conditions.</p>	<p>(September) The Board raised questions about the proposed accomplishments of the research. Board members suggested that the proposed model development had insufficiently considered potential horizontal migration as compared to the vertical movement of target chemicals, opining that transport in the vadose zone in the horizontal direction could be a significant dispersion aspect that could provide misleading results. Suggesting that the range of application of the research was limited to recently deployed explosive material, Board members opined that time considerations that would influence surface detection were not adequately addressed. Following further discussion regarding limitations of the project's technical approach, the Board moved to approve the project with the request that the project: (1) place less emphasis on model development, more on science; specifically, the need to consider lateral movement, determine what/where to sample, e.g., soil vs. vapor phase and (2) consider non-instantaneous detection methods, e.g., 24-hour samplers. The Board requested the SERDP staff to provide the discussion comments to the PI and report back to the Board on their implementation. The motion with the requirements was approved by a vote of 6-1.</p>
<p>CU-1095: Assessment and Prediction of Biostabilization of Polycyclic Aromatic Hydrocarbons (PAHs) in Sediments</p> <p>(U.S. Army Waterways Experiment Station)</p> <p>\$500K (FY98-New Start)</p>	<p>The objective of this proposed FY98 new start is to characterize various samples from biostabilization testing by a highly selective Microprobe Two-step Laser Desorption/Laser Ionization Mass Spectrometry method to describe the lateral and cross-sectional distribution of PAHs within sediments and compare this method with conventional whole sample extraction. Project steps involve: (1) correlation of results with other surface analytical techniques; (2) bench-scale bioslurry and microcosm experiments to study phase partitioning and to interpret the efficiency of biodegradation; and (3) toxicity bioassay tests. These combined efforts would be used to assess the predictive capabilities of the characterization techniques for determining how site-specific factors affect cleanup rates and acceptable toxicological endpoints so that cost-effective remediation strategies may be devised.</p>	<p>(September) Board members highlighted the apparent complexity of the program, and questioned the interpretation of data from proposed toxicity tests in terms of environmentally acceptable endpoints. Noting that the project had chosen a more rigorous toxicity test, Board members suggested that the project could benefit from inclusion of a simpler and standard toxicological bioassay.</p> <p>Noting the similarities of the proposed bioremediation research, Board members recommended that the SERDP staff consider folding the proposed project under the Flask-to-Field effort to which the SERDP Executive Director assured the Board that due consideration would be given. The Board moved to approve funding for the project, with the recommendation that the Technical Advisory Committee established for CU-720; Federal Integrated Bioremediation Research Consortium; Flask to Field Initiative assist the PI for this project during the evaluation of the proposed go/no-go milestones at the end of FY98. Board members suggested an amendment to the motion to include the action for SERDP staff to: (1) assess the feasibility of folding CU-1095 with CU-720 and (2) ensure that in the future all SERDP-funded biological, in-situ remediation projects be presented at the same meeting, with the projects presenting sequentially, so that the Board understands the uniqueness of each effort and how the projects are coordinated and integrated. The amended motion was seconded and approved by a vote of 7-3.</p>

TITLE/PERFORMER/ REQUESTED FUNDING	SUMMARY	RECOMMENDATION
<p>National Environmental Technology Test Sites (NETTS) Program</p> <p>(Navy/Air Force/EPA)</p> <p>\$2,540K (FY98)</p>	<p>The current process for gaining acceptance of cost effective innovative technologies for the cleanup of Federal installations is laborious and costly. The problem stems from several causes, including the lack of formally established technology demonstration programs ensuring protocols and quality assurance/quality control procedures sufficient to meet requirements of regulators and users and information dissemination in formats suitable for all interested parties. These causes can be addressed by a comprehensive technology demonstration/evaluation/transfer program. This continuing grouping of projects provides such a comprehensive technology demonstration/evaluation transfer program. The goal is to provide locations for comparative demonstration and evaluation of cost effective and innovative technologies to enable transfers from research to full-scale use. The Test Sites Program provides different demonstration locations in a wide variety of geologic and contaminant settings, all fully characterized. These sites include a fuel hydrocarbon site located at Port Hueneme, California, an organic contaminants site, located at the former Wurtsmith AFB in Michigan, a solvents test site located at McClellan AFB in California, and a controlled release site at Dover AFB in Delaware. This year included the SERDP Program Office's decision to discontinue funding of the energetics test site, located at Volunteer Army Ammunition Plant (VAAP) in Tennessee, based on insufficient demand for this test location and previous recommendations from the SAB and the Comprehensive Review Committee.</p>	<p>(June) Following the NETTS Program update briefing that included presentations of significant program updates and the SERDP Program Office's decision to discontinue funding of the VAAP, Board members raised questions concerning utilization of the NETTS sites and the collection of any cost benefit metrics, requesting that the cost benefit metrics be finalized. The Board recommended that SERDP stimulate the involvement of EPA-NERL (Las Vegas) in the program, e.g., via parallel review of candidate demonstration projects. The Board moved to approve FY98 funding for the NETTS Program by a vote of 8-0 with 1 abstention (Dr. Weber).</p>

TITLE/AGENCY/ REQUESTED FUNDING	SUMMARY	RECOMMENDATION
COMPLIANCE		
<p>CP-819: National Environmental Education and Training Center (NEETC) Earmark (NEETC)</p> <p>\$1,000K (FY97-Earmark)</p>	<p>Funded by SERDP as a result of an FY94 earmark, this project was provided an additional \$1,000K by Congress in FY97. This project intends to continue to pursue the following technical objectives: (1) develop a knowledge-based system prototype (TECHXPRT) that will evaluate and incorporate worker environmental safety and health issues in the design of innovative hazardous technologies; (2) implement TECHXPRT on the Worldwide Web; and (3) develop informational models to facilitate local community understanding of perceived or real hazardous waste/pollution prevention issues and acceptance of novel environmental technologies.</p>	<p>(June) The Board questioned claims made by the PI regarding a lack of attention to safety issues in the development of new environmental technologies and the relationship to the work ongoing under his project. Board members raised questions concerning the proposed payoffs provided by the project, specifically the type of metrics intended to compare results and improvements. The Board expressed concern over the apparent lack of progress made under the original \$3.5M project intended to develop an environmental curriculum for worker retraining. Board members expressed concern that the curriculum had yet to be implemented and, therefore, had produced no certificated graduates. Board members composed a recommendation to express the Board's displeasure with this effort's goals and performance, reaching a consensus that was read as follows:</p> <p>The Scientific Advisory Board recommends that SERDP project CP-819: NEETC Earmark, not be funded. This is a Congressionally-mandated program; the effort does not further SERDP objectives for two basic reasons:</p> <ol style="list-style-type: none"> 1. NEETC does not represent an area consistent with the SERDP mission; 2. Expenditures for the project will not further the strategic environmental objectives of SERDP. <p>The SAB recommends that the SERDP Council take whatever actions necessary to eliminate SERDP expenditures for this project and to discourage future SERDP earmarks. Generally, Congressionally-mandated SERDP programs bypass critical review procedures mandated by Federal law, as well as critical checks and balances necessary for project funding. There is a significant risk that the quality of SERDP-funded R&D and the usefulness of projects to DoD and DOE thereby will be undermined. This project appears to be more appropriately funded by NIOSH.</p> <p>The finalized recommendation was seconded and approved by a vote of 8-0.</p>

TITLE/AGENCY/ REQUESTED FUNDING	SUMMARY	RECOMMENDATION
<p>CP-1060: Laser-Based Spectrometers for Measurement and Monitoring of Toxic Metals and Organic Emissions</p> <p>(DOE: Sandia National Lab)</p> <p>\$1,420K (FY98)</p>	<p>The objective of this continuing project is to: (1) assess the feasibility of sharing three common system elements (the laser, the sample interaction region, and the operating software); (2) develop a configuration for a common IR/LIBS sensor; and (3) develop an integrated system for field-testing to demonstrate simultaneous detection of metals, VOCs, and NOx. The advantages of developing a common instrument include having use of a laser-based instrument capable of real-time in-situ sampling, minimizing complicated and costly laboratory analysis and inaccuracies introduced by grab sampling, and cost savings resulting from monitoring a large number of sites with an integrated instrument.</p>	<p>(June) The Board raised questions concerning the project's focus on developing continuous emissions monitors (CEMs) as compared to the efforts of private industry to comply with clean air regulations. Stating that companies have been seeking other ways to come into compliance, Board members indicated concerns with the project's justification, opining that development of CEMs seemed more of a last resort. The Board requested that the PIs identify several specific compounds at DoD and DOE facilities that are to be addressed by CEMs for compliance and why other means for achieving compliance are not appropriate. Suggesting that the researchers be more aware of the ultimate sponsor for the work performed under the project, Board members raised questions regarding the technology transfer being pursued under the scope of the project, noting that the project needed a clear DoD linkage. The Board moved to approve funding for the project with the recommendation that the active participation of the User Group be pursued and that the User's Group evaluation of the direction of the project be presented at the project's briefing next year to request FY99 funding. The project was approved by a vote of 7-1.</p>
<p>CP-1077: Plasma Assisted Catalytic Control of NOx</p> <p>(USAF: Armstrong Lab)</p> <p>\$390K (FY98-New Start)</p>	<p>The objective of this proposed FY98 new start is to design and construct a prototype of a Plasma-Assisted Catalytic (PAC) device for controlling NOx emissions from diesel-powered generators commonly used in mobile flight-line equipment at U.S. Air Force bases. This project will evaluate the performance of the PAC technology for these generators, including the ultimate suitability of the equipment. PAC offers enhanced performance over unassisted lean-NOx catalysis, and the use of plasma to enhance the activity of the selective catalytic reduction technique is a promising new technique that will be investigated in this proposed project.</p>	<p>(August) The Board was pleased to note leveraged funding from both DOE and Cummins, who is a commercial contributor providing support to co-performers on the project located at Lawrence Livermore National Laboratory. The Board was also pleased to note that the Cummins support was to include: (1) providing diesel engines and (2) modifying the engines as required to accommodate the experiments. The project was approved by a vote of 7-0.</p>
<p>CP-1078: Enzymes for Degradation of Energetic Materials and Demilitarization of Explosives Stockpiles</p> <p>(DOE: Pacific Northwest National Lab)</p> <p>\$325K (FY98-New Start)</p>	<p>The objective of this proposed FY98 new start is to develop an enzyme-based technology that can efficiently, safely, and economically render energetic materials non-hazardous. This alternative enzyme-based process can be used to convert explosives into commercially valuable chemicals, and will meet the regulations under the Clean Air Act Amendments, RCRA and FIFRA. Recent developments in enzyme technology allow the production, using cross-linking enzyme crystals (CLEC), of robust enzymes that can withstand harsh reaction environments.</p>	<p>(August) The Board raised questions regarding the proposed program plan for FY98, citing an apparent lack of initial research and data collection to convince the Board of the feasibility of the proposed enzyme reaction kinetics proposed by the PI. Consequently, the Board voiced a need for the PI to look more closely at the reaction kinetics and mass transfer rates of the proposed enzyme-based processes. These concerns were reflected in the motion to: (1) recommend approval for only \$150K of the \$325K request for FY98 to allow for initial enzyme reaction feasibility studies that would include initial reaction kinetics and mass transfer data to be collected and (2) require that the PI return when ready next year to address the concerns raised by the Board. The Board noted that the brief should demonstrate the feasibility of enzyme-based reaction kinetics for the intended use in order to gain a recommendation for release of the balance of FY98 funding. The motion to allow partial FY98 funding was approved by a vote of 4-3.</p>

TITLE/AGENCY/ REQUESTED FUNDING	SUMMARY	RECOMMENDATION
<p>CP-1079: Hypergolic Non Detonative Neutralization in Production and Demilitarization Followed by Steam Reforming and Flameless Oxidation</p> <p>(DOE: Pacific Northwest Laboratory)</p> <p>\$395K (FY 98-New Start)</p>	<p>The objective of this proposed FY98 new start is to develop a two-step system for high throughput, cost-effective, and environmentally conscious disposal of energetic materials (production wastes or assembled munitions). The proposed process consists of: (1) reacting the energetic materials with a hypergolic chemical, which neutralizes the energetic materials while precluding a detonation and (2) analyzing and evaluating the neutralized organic residues for possible reuse applications or effective safe disposal.</p>	<p>(August) Board members raised questions about the history of the chemical reactions proposed for application, asking for any explanation why, if as straightforward as the PI suggested, it had not been previously exploited. The Board noted the lack of clarity provided in the briefing regarding the proposed reuse of neutralized organic residues that would be the byproducts of the neutralizing reactions, as well as the lack of details provided in the briefing regarding any proposed analysis of reaction end-products to allow for any measurement of results. While noting the important need the research was proposing to address, Board members stated that the project approach, as presented, left some questions unanswered. Consequently, the Board moved to recommend approval for FY98 funding with the proviso that: (1) the PI return next year to brief the Board prior to release of FY99 funding and (2) at this next briefing, the PI should demonstrate the practicality of proposed reactions and the general characteristics of end-product compounds. The motion including the recommendations was seconded and approved by a vote of 6-1.</p>
<p>CP-1104: Optimization of an Innovative Biofiltration System as a VOC Control Technology for Aircraft Painting Facilities</p> <p>(University of Texas at Austin)</p> <p>\$87K (FY98-New Start)</p>	<p>The objective of this proposed FY98 new start is to investigate an innovative, high flow-rate biofiltration method with the added advantages of: (1) improved safety and (2) no secondary waste stream generation. The proposed design incorporates several novel features such as recirculation inoculation during start-up, a slip stream feed system to maintain biofilter viability during low loading or shutdown of painting operation, periodic changes in feed direction through the filter, and a nutrient aerosol delivery system. The work will be conducted in five phases: (1) experimental preparation and start-up including plans, protocols, QA/QC, and initial testing; (2) optimization of the directionally-switching system; (3) optimization of configuration and composition of slip stream feed; (4) construction, operation, and optimization of an integrated laboratory unit on single and multiple components; and (5) modification of existing pilot unit and subsequent field testing.</p>	<p>(September) The Board suggested that at some point the SERDP staff should ensure that the Services are advised of the research products resulting from this project, including the review and coordination of results from previous SERDP funded efforts in the VOC control technology for effective leveraging. Board members questioned the strategic nature of the project and commented that this project has no essential bearing on mission readiness, and environmental matters such as compliance and would not qualify as SERDP project. Other Board members countered this opinion stating that VOC emissions from painting operations and the resulting Notices of Violation are major problems for DoD, and the expected results of this project can enhance the cost effectiveness of proven biofiltration technology to solve environmental compliance issues with long-range cost savings for VOC treatment at these DoD installations. The Board moved to approve project funding as requested with an action item that the PI should actively involve DoD services in partnership in the out-years and leverage prior SERDP funded projects in the VOC control technology area. The amended motion was approved by a vote of 6-1, with Dr. Loehr abstaining.</p>

TITLE/AGENCY/ REQUESTED FUNDING	SUMMARY	RECOMMENDATION
<p>CP-1105: Membrane-Mediated Extraction and Biotreatment of VOCs (USEPA: NRMRL, Research Triangle Park) \$475K (FY98-New Start)</p>	<p>The objective of this proposed FY98 new start is to develop a novel Membrane BioTreatment (MBT) system, which combines a first-stage micro-porous hollow fiber membranes unit to extract and concentrate VOC contaminants into a low-volatility organic stripping fluid, with a similar second-stage membrane unit in which the VOCs are extracted into a nutrient medium for biotreatment. Independent operation and optimization of each stage of the process is intended to accommodate intermittent painting operations and reduce equipment size. The work will be conducted in two phases, with a go/no-go determination made at the end of the first. The two phases entail: (1) characterization of process streams at bench scale to show technical feasibility using representative exhaust from laboratory spray booths and (2) evaluation of the pilot MBT system at Tyndall AFB to determine the long-term performance of microbes and hardware, while developing and validating scale-up parameters.</p>	<p>(September) The Board raised several concerns regarding mass transfer rates, rate limiting steps in the system, interference by water vapor in the system, and capital costs of the system compared with biofiltration systems, specifically challenging the adequacy of 90 percent removal efficiency of organic vapors from a gas stream from a regulatory perspective. Board members raised concerns regarding the lack of leveraged funding from Air Force and questioned why SERDP should be paying for the proposed research. The SERDP Executive Director addressed the concerns by indicating that Air Force environmental quality budget is dramatically falling, and SERDP is addressing high-priority needs of the Air Force and other Services through this competitive process. Other Board members favorably compared the science behind this project to a pollution prevention (PP-1112) presentation made earlier and opined that the technology is ready for transition. Consequently, the Board moved to approve the project with an amendment to require the project to rebrief to allow the Board to reevaluate the project after its first year to further influence the effective demonstration of the MBT system. The amended motion was approved by a vote of 8-0.</p>
<p>CP-1106: Characterization of Particulate Emissions: Size Characterization and Chemical Speciation (University of Utah) \$689K (FY98-New Start)</p>	<p>The objective of this proposed FY98 new start is to develop innovative sampling and analytical techniques utilizing the following instruments: (1) portable dilution sampler for use with aerosol instruments; (2) aerosol time-of-flight mass spectrometer (ATOFMS) for positive and negative ion detection; (3) photoelectric detector (PED) for rapid, composite measurement of PAHs, which are prevalent chemical components of particulate emissions; (4) micro-orifice impactors to obtain size-segregated particles for chemical analysis; and (5) standard chemical analyses of filter samples targeted toward likely toxic constituents. After calibration of the instruments on major classes of DoD-relevant sources, a detailed field study will be conducted at Hill AFB, which can provide a wide representation of typical DoD emissions sources.</p>	<p>(September) Board members asked several questions regarding the mechanism by which the particles are captured in ATOFMS, the size of the particles that can be detected, mass versus size of the particle being measured in ATOFMS, definition of calibration of instruments, phenomenon of particle movement in the ATOFMS, significance and relevance of data collected at various previous experiments, and the potential for reducing the physical size of the ATOFMS instrument. The Board expressed concern over lack of leveraging from engine manufacturers, to which they were advised that: (1) industry in general prefers to ignore the data to preclude them being subject to stringent particulate standards and (2) the results of this project may have significant impact and be of interest to the EPA because of the current concern on the relationship of particulate matters and associated health effects, as well as insufficient data to perform the required risk assessment studies. Consequently, Board members suggested that SERDP partners, specifically EPA and DOE, be fully apprised of the results of the project, and encouraged the PI to solicit other partners who can commit funding in the outyears if the technology works. The Board moved to approve the project at requested funding level with an amendment to the motion to require: (1) a project rebrief next year that demonstrates strong partnerships and a clear transition plan and (2) development of a user committee next year to facilitate user awareness of the ongoing research. The amended motion was approved by a vote of 8-0.</p>

TITLE/AGENCY/ REQUESTED FUNDING	SUMMARY	RECOMMENDATION
<p>CP-1107: Electrochemical Advanced Oxidation Process for Shipboard Final Purification of Filtered Black Water, Gray Water, and Bilge Water</p> <p>(Sonoma Research Company)</p> <p>\$153K (FY98-New Start)</p>	<p>This proposed FY98 new start intends to develop a new, patented advanced oxidation process (AOP) which uses an electrode made from titanium fibers coated with doped titanium dioxide to electrochemically generate hydroxyl radicals from water. The process requires no addition of oxidants and is more cost-effective than other AOPs especially at higher contaminant concentrations. The project has four technical objectives: (1) improve methods for laboratory testing and theoretical understanding of electrodes; (2) improve service life of electrodes to 16 months, including reprocessing, by retarding embrittlement and optimizing coating operations; (3) increase reaction rate six-fold by improving electrode construction through increased surface area, modified crystal structure, and additional dopants or second overcoat; and (4) characterize operating conditions and environmental factors to determine optimum process parameters and develop any necessary countermeasures.</p>	<p>(September) Board members were concerned that the membrane (electrodes) was susceptible to corrosion from salts (electrolytes). They were advised that a corrosion problem is not anticipated with a current system which has been operating at 20-100% seawater concentration. Yet when the current stainless steel cathode is replaced with copper for higher capacities, it may require further evaluation. The Board inquired about the anticipated value-added to the current Navy system assuming the proposed project is successful, specifically whether any similarly developed commercial devices were available and if any other R&D programs have been funded by other Federal agencies to address similar needs, specifically NASA. A similar system that uses titanium oxide/antimony and tin oxide has been developed, yet this system requires high current and corresponding lower efficiency resulting in short life time of the electrodes. The Board was assured that the early development phase of the proposed technology was funded by USDA under an SBIR phase I program and that NASA was currently sponsoring an electrochemical Fenton reagent-based Phase I and II SBIR program. The Board moved to approve the project at the requested funding level, and the project was approved by a vote of 8-0.</p>
<p>CP-1108: Novel Nonporous Fouling-Resistant Composite Nonofiltration Membranes and Membrane Separation Systems for Wastewater Treatment</p> <p>(North Carolina State University)</p> <p>\$411K (FY98-New Start)</p>	<p>The objective of this proposed FY98 new start is to develop a highly water-permeable, non-porous, thin-film, composite membrane, which utilizes a block copolymer overcoat to provide longer service life and less frequent cleaning. Four tasks are planned: (1) optimize chemistry of three promising candidate polymers for evaluation and down-select; (2) develop and scale-up membranes; (3) develop bench-scale module (in spiral-wound configuration to minimize fouling) and test with model oil emulsion; and (4) manufacture test modules (combined with potential pretreatment and automated cleaning systems) and test in pilot system with simulated bilge water. This project is a joint effort with a developer of membrane modules, and another commercial partner will assist in fabrication of the full-scale unit to ensure smooth transition.</p>	<p>(September) The Board raised several concerns regarding the lack of fundamental understanding of the problem, bloated budget, and lack of coordination/leveraging of results from previous SERDP and Office of Naval Research (ONR) funded membrane technology projects to address the Navy's shipboard waste problems. Board members expressed concern about whether the brief was drawing upon an existing resource base such as reverse osmosis and ultrafiltration which have been in practice for more than 20 years, specifically asking if the brief was familiar with previous SERDP funded ultrafiltration project (Dr. John Benson, PI). The brief indicated he was not. Citing a possible serious flaw in the project's hypothesis, Board members indicated that most of the fouling in wastewater membrane treatment technology is caused by hydrophilic substances/contaminants such as humic and folic acids. Board members challenged the concept of using hydrophilic membranes to deal with preventing blockage by hydrophilic macromolecules and colloids, indicating a lack of basic understanding of membrane physics and questioned the efficacy of Peer Review process for this particular proposal. The Board considered deferring approval of the project until suitability of hydrophilic membrane coatings to treat these substances is resolved, citing three basic issues: (1) lack of basic understanding of problem; (2) bloated budget to manipulate and optimize one membrane; and (3) a lack of demonstrated efficacy for this technology to solve this problem versus other related membrane technologies. Rather than deferring approval of project, the Board moved to reject the proposal without prejudice, and this motion for rejection was approved by a vote of 8-0.</p>

TITLE/AGENCY/ REQUESTED FUNDING	SUMMARY	RECOMMENDATION
	CONSERVATION	
<p>CS-048: Whale Monitoring Using IUSS (Office of Naval Research) \$1,265K (FY98)</p>	<p>The goal of this continuing project is to apply capabilities of the U.S. Navy Integrated Undersea Surveillance System (IUSS) to support the High Seas Driftnet Fisheries Act (PL102-582) and other national treaty and maritime law enforcement requirements and to monitor various species of marine mammals to contribute toward conservation and regulations compliance. Initial usage of operational and decommissioned parts of the earliest IUSS technology, the Navy's Sound Surveillance System (SOSUS) hydrophone arrays, has led to access to the entire suite of IUSS assets, including Surveillance Towed Array Surveillance System (SURTASS) towed arrays, Fixed Distributed Systems (FDS), and Low Frequency Active SURTASS, the latest Navy antisubmarine warfare technology. The dual use of this defense technology has led to major advances in environmental compliance capabilities for DoD. This SERDP program also fostered new interagency partnership through NOAA usage of IUSS to assess the utility of acoustic technologies for censusing marine mammals, culminating in a highly successful Pacific sperm whale survey in 1997. Further joint surveys are planned in 1998, which are harbingers of a revolution in marine mammal monitoring and management by National Oceanic and Atmospheric Administration/National Marine Fisheries Service (NOAA/NMFS).</p>	<p>(April) The Board questioned the PI's assertion that the acoustic survey was better than aircraft. It was explained that the acoustic detection systems can detect and differentiate specific animals, and a key aspect of the project would be to develop a correlation between the acoustic detection and visual surveys to estimate better the animal count and whale pod size. The Board also inquired how the number of Minke whales in the North-East Atlantic are determined, given the difficulty of performing actual counts. Information provided revealed that these counts are based on the density and frequency of vocalizations. The system counts the vocally active animals providing a minimum count for the actual whale population. The Board moved to approve the FY98 funding for this project by a vote of 10-0.</p>
<p>CS-1054: Development and Demonstration of a Risk Assessment Framework for Natural & Cultural Resources on Military Training & Testing Lands (DOE: Oak Ridge National Lab) \$430K (FY98)</p>	<p>This continuing project returned to clarify the draft conceptual framework prior to release of its FY98 funding, as stipulated in an action item from the August 1996 SAB meeting. The goal of this project is to develop a consistent, defensible, and easily implemented framework for assessing risks to natural and cultural resources from military testing and training missions, thus maintaining required levels of readiness. This framework would incorporate physical, chemical, and biological stressors, including noise, and their direct and indirect effects, short and long term, on natural and cultural resources.</p>	<p>(June) The Board raised a number of questions about the scope and direction of ongoing project efforts. Several members were still unclear about the scientific approach and the anticipated science inputs to the overall framework. Board members noted the importance of this research but were not convinced that the end product could be achieved. Stating the belief that the risk assessment framework would be a useful tool to DoD/DOE and other agencies if successfully developed, the Board motioned to approve the project's FY98 funding with the recommendation that the PI return next year and rebrief the Board on the FY99 plans. The Board required the PI to address the concerns raised, specifically whether the project is: (1) dedicated to the direction indicated by the Board; (2) adequately focused on the scientific issues in its framework development; (3) identifying framework gaps/weak links; and (4) identifying specific activity areas incorporated into framework. The project including the recommendations was approved for FY98 funding by a vote of 6-1, with 1 abstention (Dr. Moss).</p>

TITLE/AGENCY/ REQUESTED FUNDING	SUMMARY	RECOMMENDATION
<p>CS-1069: Marine Mammal Responses to Low Frequency Sound</p> <p>(Office of Naval Research)</p> <p>\$800K (FY97-New Start)</p>	<p>The objective of this FY97 new start project is to conduct research aimed at quantifying the responses of selected free-ranging (non-captive) marine mammal species to loud, human-made, low frequency sounds. Such research is targeted to address the Marine Mammal Protection Act (MMPA) compliance needs of Navy supported activities (both research and operational) that utilize low frequency sources. It is recognized that such research must meet the requirements of current National Marine Fisheries Service and State scientific research permits and the associated ATOC Marine Mammal Research Programs (MMRP).</p>	<p>(October) The Board focused its questions on the project's objectives and proposed products. Board members expressed the lack of clarity concerning what the proponents planned to do, how many experiments they planned to perform, what types of information requirements they were planning to address, and what drivers existed for such information. Further, there seemed to be some confusion regarding the assertion that this project would provide compliance tools or a compliance program to the Navy and other interested parties. The Board moved to approve the project for FY97 funding with the stipulation that the objective statement be better clarified. Specifically, the project was requested to: (1) rephrase and narrow its statement of objectives, (2) describe the technical approach to support the central objective, and (3) describe the planned deliverables that will flow from the objective as well as the deliverables' impact on standard setting for Navy compliance procedures. This modified motion was seconded and approved by a vote of 7-0.</p> <p>(April) This project returned to brief the Board to address specific questions raised at the October 1996 meeting. The Board inquired about the existence of any agreement from The Office of Naval Research (ONR) regarding pursuit of any promising technology developments that may emerge from this project. ONR technology transition investment was in place for this fiscal year and will grow over the next two years to provide for future development of monitoring technologies, databases, and advanced monitoring and mitigating procedures. The Board expressed interest in the extent of transferable results between species, specifically the applicability of results gathered from elephant seals to whale studies. Some transfer of test results could be applied within the scope of proposed work. The elephant seal response to low frequency sound would be a very good indicator of the response of those whales that reside in the deeper regions, yet are rarely seen. The Board stated that this briefing adequately addressed the recommendations from the minutes of the October 1996 SAB meeting that required this project to provide a future SAB update with more project details.</p>
<p>CS-1082: Information and Technology Tools for Assessment and Prediction of the Potential Effects of Military Noise on Marine Mammals</p> <p>(Naval Command, Control, and Ocean Surveillance Center)</p> <p>\$352K (FY98-New Start)</p>	<p>The objective of this proposed FY98 new start is to: (1) study and compare the evidence for normal versus pathological changes of marine mammal ear anatomy; (2) utilize state-of-the-art knowledge about baleen whale ears to motivate a computational model of baleen whale hearing ability; and (3) develop a statistical approach that will help identify whale "hot spots," seasonal and/or geographic peaks in whale density, or migratory corridors.</p>	<p>(August) Board members raised questions concerning the technical approach and scope of the project, including the variability within the group of marine mammals that are proposed for testing within the scope of the project. The Board questioned the transition of laboratory results of any hearing impact to an understanding of the true effect on the animal. Board members expressed concerns regarding the actual transition from model development to application, recommending that Task 3 of the project be integrated with other ongoing SERDP marine mammal projects. The Board moved to recommend approval of the project with the following conditions: (1) ensure that the project is properly integrated with the ongoing ONR program; (2) Task 3 of the project is to be modified to integrate with the ongoing Marine Mammal projects (CS-048 & CS-1069); and (3) the project should be briefed prior to release of FY99 funds. The Board approved the motion with recommendations by a vote of 7-0.</p>

TITLE/AGENCY/ REQUESTED FUNDING	SUMMARY	RECOMMENDATION
<p>CS-1083: Assessment of Training Noise Impacts on the Red-Cockaded Woodpecker (U.S. Army Construction Engineering Research Lab)</p> <p>\$350K (FY98-New Start)</p>	<p>The objective of this proposed FY98 new start is to: (1) determine the impact of training noise (specifically, blast, small arms, helicopter noise, and maneuver noise) on the endangered red-cockaded woodpecker (RCW) and (2) prove and disseminate cost-effective techniques that installations and other researchers can use to evaluate and monitor effects of military noise on animal species. The researchers intend to provide the information required to assess and manage risk to both military training capability and the endangered RCW and will provide factual basis for mitigation and management protocols and guidelines.</p>	<p>(August) Board members raised questions about the level of integration between this proposed research and similar noise impact related research being performed by the Services at other installations. Concerned whether the project had, or planned to, incorporate any noise impact research from the commercial sector or other sources in the literature, the Board was satisfied to learn that prior efforts in support of the proposed research have involved literature searches that had identified the technology gaps in noise impact studies. These efforts had allowed the research team to form conclusions regarding prior noise impact studies and aided in focusing the current research effort. The Board moved to approve the project as presented. In the absence of a quorum, the Board voted 5-0 to approve this motion, with 1 abstention (Mr. Conway, who was absent during the brief). This vote was later ratified in the presence of a quorum by a vote of 7-0.</p>
<p>CS-1100: Predicting the Effects of Ecosystem Fragmentation and Restoration Management Models for Animal Populations (Northern Arizona State University)</p> <p>\$180K (FY98-New Start)</p>	<p>The technical objectives of this proposed FY98 new start are to develop species-specific models that predict the responses of mobile animal species in heterogeneous landscapes. Modeling efforts would build on connections between life history characteristics and the responses of mobile animals to habitat fragmentation and restoration. Field research would permit parameterization of models and testing of model predictions, leading to refinement of the conceptual approach.</p>	<p>(September) Board members raised questions concerning the difficulty encountered in prior efforts to transfer results from the ecological model developed to analyze fragmentation of spotted owl habitat, inquiring how the data developed as part of this effort in a specific ecological setting would be more transferable to other habitats than the spotted owl data. Other Board members expressed support for the project underlining: (1) the new requirements that would be a result of new Threatened and Endangered Species regulations and (2) the importance of the need for predictive capabilities versus the current observational type. They expressed a desire to ensure interaction of this project with similar, prior SERDP-funded efforts and the integration of all the Conservation modeling efforts, and stressed that the final deliverable from the project should be a managerial tool for decision making. The SERDP Executive Director replied that all the individual models developed as part of SERDP and DoD Reliance efforts would feed into a large, overarching, consolidated management tool known as Land Management System (LMS), with an initial version of this tool available to DoD installation land managers at the end of FY98. Noting the lack of scientific details in the proposal, Board members questioned the usefulness of results that will be produced under the project, specifically the applicability at ecologically-different DoD sites. The Board moved to approve FY98 funding for the project, with the requirement for the PI to submit defined, data-based deliverables to SERDP as the project progresses. The motion, with requirements, was approved by a vote of 9-0 with 1 abstention (Dr. Loehr).</p>

TITLE/AGENCY/ REQUESTED FUNDING	SUMMARY	RECOMMENDATION
<p>CS-1101: Correlation of Biogeochemical and Soil Sensor Data for Use in Managing the Impact of Military Training on Desert Ecosystems</p> <p>(Naval Facilities Engineering Service Center)</p> <p>\$400K (FY98-New Start)</p>	<p>The objective of this proposed FY98 new start is to relate the timing and duration of large-scale military training exercises in the desert to their ecological impacts through biogeochemical effects and develop tools to assess and manage training associated ecological impacts. The proposed research would include identifying impact disturbance induced changes in the nitrogen and carbon biogeochemical cycles, correlating this data with responses from sensors placed in training areas, and incorporating the data into predictive land-use models. These assessment tools would fulfill a critical DoD need to manage disturbance induced changes in the ecosystem from which seasonal, spatial, and temporal variation can be filtered and provide ground-truth for approaches that use remote sensing.</p>	<p>(September) Board members indicated that the introduction of other nitrogen sources would establish their own nitrogen cycle that would overlay the naturally occurring cycles creating disturbances. The Board questioned the proposed sampling and chemical analysis methods and voiced concerns that expected concentrations levels of the target chemicals to be sensed may be too low to allow direct sampling from air, opining that the researchers would need to utilize specialized collection and trapping over time, not currently under consideration within the scope of the project. Board members summarized their concerns: (1) the project would address only a small portion of the risk to training lands, as 80% of the risks to be evaluated as part of the project could be addressed by surface examination; (2) the uncertainty concerning the use of data to be generated from this project, which may result in the over-restriction of training land use; (3) neither the flux chambers nor the sensors have been screened for use in soil; (4) the dynamics of cycles (seasonal, daily, over decades) and their impacts had not been clearly addressed within the scope of the project; (5) the project appeared to be a stretch to accomplish the characterization of mechanical training ranges as proposed by the researchers; and (6) the underlying preliminary science, specifically relating to sensor use, was missing. With consideration of the concerns voiced, the Board moved to approve the FY98 funding for the project, with the caveat that the SERDP staff: (1) review the project's FY98 program for appropriateness of funds and (2) make a go/no-go decision at the end of the first year based on the feasibility of this technology at the field level. The motion received a vote of 2-2. Since the vote was a tie and in the absence of a quorum, no action could be taken as a result of the briefing.</p>
<p>CS-1102: Improved Units of Measure for Training and Testing Area Carrying Capacity Estimation</p> <p>(U.S. Army Construction Engineering Research Lab)</p> <p>\$300K (FY98-New Start)</p>	<p>This FY98 new start proposes to improve significantly the methodology to better predict the environmental consequences of military training activities as an installation management tool. The focus of this project is to develop quantitative units of measure (such as erosion and species composition on land) to estimate training and testing land carrying capacity, extend the spatial and temporal scale of the methodology to include individual training areas and changes in training and land condition throughout the year, and validate the improved methodology. The results from the existing SERDP project on Terrain Modeling and Soil Erosion are being used to improve estimates of land condition and can be extended to off-site impacts (sedimentation and water quality).</p>	<p>(September) Discussing the merits of the proposed research, Board members emphasized the need for water erosion models and opined that despite the predominance of arid and semi-arid regions on DoD land, the impact from soil erosion is high when they are wet. The PI pointed out that the distribution of impacts from water erosion was currently a major weak link, one that his project was intended to address. Citing the lack of basic science in the brief and the data set requirements for the project, Board members questioned the apparent limitations in the model development requirements necessary for incorporation into the models. Appraised that many well-characterized DoD sites will provide this robust data requirement, the Board moved to approve the FY98 funding for the project, with the caveat that: (1) a list of planned peer reviewed publications be developed by the PI and (2) the project have strong interaction and be well coordinated with other SERDP-funded modeling efforts in the Conservation Thrust Area. The motion, with requirements, was approved by a vote of 10-0.</p>

TITLE/AGENCY/ REQUESTED FUNDING	SUMMARY	RECOMMENDATION
<p>CS-1103: Identify Resilient Plant Characteristics and Developing Wear Resistant Plant Cultivars for Use on Military Training Lands</p> <p>(U.S. Army Cold Regions Research & Engineering Lab)</p> <p>\$200K (FY98-New Start)</p>	<p>The primary objective of this proposed FY98 new start is to provide DoD guidance for mitigation methods resulting in more resilient plant species that would help to increase training opportunities on existing training areas. The resulting guidance would assist land managers and trainers in making choices on training schedules and in estimating cost and time requirements for maintaining military readiness. Plant and soil data would be combined which will allow land users to make knowledgeable choices concerning plant selection and site-rehabilitation procedures to reduce soil erosion. Supporting activities would involve field and greenhouse studies to quantify the degree of compaction that occurs during training and relate soil condition to root injury in plants with known resilience.</p>	<p>(September) Raising several concerns regarding the project's technical approach, the Board asked about the anticipated improvement to the resiliency of plant species to be accomplished under the scope of the project and the proposed metric(s) intended to measure any improvements. Board members were curious as to the benefit of the results of this research as compared the information that can be requested of the USDA regarding specific plants for specific applications. They were assured that prior USDA research had been done to address other needs, such as erosion control and livestock habitat, but not strictly to develop plants to withstand the intensity of training exercises as proposed under this research. Voicing other concerns, the Board noted the lack of details on the cost portion of the proposal and questioned the need for a lengthy, two year effort to collect data that was believed to already exist, recommending a go/no-go decision be inserted at the end of the first year based on the results gathered to that point. Voicing support of the suggested review after the first year, Board members opined that the SERDP In Progress Reviews (IPR) held each May serve as an effective evaluation and would, in this case, serve as the decision point. With assurances from the SERDP Executive Director that the go/no-go decision would be critically evaluated at the May 1998 Annual IPR of SERDP projects, the Board moved to recommend approval of the FY98 funding for the project, with the caveat that special attention be paid at the May 1998 SERDP IPR by the SERDP staff to evaluate the aforementioned go/no-go decision. The motion, with requirements, was approved by a vote of 10-0.</p>

TITLE/AGENCY/ REQUESTED FUNDING	SUMMARY	RECOMMENDATION
PP-63: DoD/DOE Clean Agile Manufacturing of Energetics Materials (Office of Naval Research) Informational Only	This briefing was a concluding project summary. The objective of this project was to develop and demonstrate energetics materials, processing technologies, tools, and concepts for re-configuring existing PEP life-cycle facilities into clean, agile operations that will function economically with total life-cycle wastes reduced by 90 percent from a 1994 baseline. This project also addressed the requirements to develop new chemicals and processes to prevent pollution and simultaneously increase energy and lower production costs, as identified in the Defense Safety Board Task Force on Environmental Security report dated April 22, 1995.	(June) Board members opined that this briefing adequately addressed the recommendations from the minutes of the October 1996 SAB meeting requesting a future SAB update along with the other energetics-related projects and that no action was needed concerning the project. The Board commended the PI on the high-level of strategic research accomplished under the project, as well as the successful leveraging of funds to accomplish the research.
PP-139: Laser Cleaning and Coatings Removal (LCCR) (USAF: Wright Laboratory) \$950K (FY98)	This continuing project is a field demonstration of a prototype, laser-based facility for environmentally acceptable, affordable, and controllable component cleaning and coating removal, including metal plating. Laser cleaning and coating removal will be demonstrated on components ranging from turbine engine blades to landing gear and radomes. System operations will be fully automated and computer controlled with on-line instrumentation for component positioning and measuring and controlling laser inputs to the part surfaces.	(April) The Board raised some questions regarding necessary computer software components required by the project, specifically voicing some concerns over the volumes of new computer codes that needed to be written versus commercially acquired. Emphasis was on the risks to project schedules due to the complications and delays that often accompany the use and integration of custom software. The Board raised concerns involving cost estimates to implement the results of the project and the impact to economic feasibility of the project. As a result of these concerns, the Board moved to approve the project with the provision that an estimate of the cost to install the LCCR at defense installations and depots be prepared and that this cost estimate be added as a formal project milestone. The motion with recommendations was approved by a vote of 9-0.
PP-158: Advanced Fire Fighting Streaming Agents (USAF: Wright Laboratory) Informational Only	This project was briefed to provide a status report of progress in response to an action item from the February 1996 SAB meeting. The objective of this effort was to develop a "drop-in" clean, environmentally safe streaming fire suppressant to replace Halon 1211 used in flightline and aircraft portable fire extinguishers. Although extensive research has been conducted by both industry and the DoD, a suitable replacement for Halon 1211 used in flightline and aircraft portable fire extinguishers has not been found/developed. Prior efforts to find a replacement concentrated on currently in-production chemicals and were directed at finding a chemical that had a low to zero ozone depletion potential, was non-corrosive, left little to no residue, had low toxicity, and had a fire suppressant effectiveness close to that of Halon 1211. Perfluorohexane (C ₆ F ₁₄) was recommended as the candidate replacement agent for the DoD and the EPA tentatively approved it for military fire fighting use only; however, the Air Force recommended not to field this chemical due to the chemical's long atmospheric lifetime.	(April) The Board raised questions about the future of ongoing project efforts. While FY97 is presently the last year of scheduled SERDP funding, the Air Force is committed to finding a replacement to Halon 1211 and has committed S&T funds to the effort. The project may approach SERDP with a request for FY98 funds based on the results of the FY97 activities. The Board indicated satisfaction that the project status update adequately addressed the recommendations from the February 1996 SAB meeting.

TITLE/AGENCY/ REQUESTED FUNDING	SUMMARY	RECOMMENDATION
<p>PP-867: Solventless Manufacture of Artillery Propellant Using Thermoplastic Elastomer (TPE) Binder (Naval Air Warfare Center) \$300K (FY98)</p>	<p>This project appeared before the Board to address questions the Board raised during the August 1996 Meeting, specifically the relationship of the project with the Crusader Weapon System Program. The objective of this continuing project is to demonstrate the feasibility of reducing or eliminating the emission of volatile organic compounds (VOCs) associated with the production of multibase gun propellants by using thermoplastic elastomer (TPE) propellants. Artillery propellant production currently creates up to 2.5 tons/day of VOC emissions, based on an annual production rate of 5.5 million lb/day of triple-base propellants. New propellant formulations which reduce or eliminate the use of solvents will be developed and evaluated for replacement of current propellants that require solvents to manufacture. After down-selecting to one or two formulations, manufacturability, safety, sensitivity, and performance characteristics will be evaluated in "proof-of-principle" tests.</p>	<p>(June) During discussion of the project, the Board raised questions concerning the level of involvement of the different users with the project, noting the appearance of no real user community commitment to support the use of the new propellants. Opining that the project had too limited a scope during times of limited funding, Board members expressed concern that the project had too much of an Army focus and that the Crusader Weapon System Program should be a larger contributor. The Board made a motion to approve the project with the provision that the PI return to brief the SAB in FY98 on the following issues: (1) describe the extent and significance of the VOC problem with respect to the overall gun propellant issue, and that which is specific to Radford AAP; (2) demonstrate that SERDP funds are primarily focused on the reduction and/or elimination of VOCs from gun propellants using TPE binder; (3) the user community must be an active participant in the development and implementation of this new propellant and facilitate the demonstration that TPE can meet the Army's more stringent requirements; and (4) describe any planned outyear funding by the single production manager and potential Army and Navy users for the purposes of production process evaluation and field testing. The project with the detailed requirements was approved by a voted of 8-0.</p>
<p>PP-1042: Trapped Vortex Combustor for Gas Turbine Engines (USAF: Wright Laboratory) Informational Only</p>	<p>This continuing project returned to brief the SAB to review the project's accomplishments, requirements, and integration with other programs to improve further engine design and reduce emissions. The goal of this project is to develop a pilot-scale trapped vortex (TV) combustor that will: (1) reduce aircraft pollutant emissions (NOx, VOCs, CO, and PM-10) by 60 percent, bringing them significantly below the proposed 1996 EPA regulations and (2) reduce the NOx emissions from land and marine based gas turbine engines burning distillate fuels by 60 percent, bringing them below the 1995 EPA regulation. Additionally, the trapped vortex design could result in a three percent decrease in fuel consumption.</p>	<p>(June) The Board was interested to learn that commercial interest is anticipated to be great and that commercial applications should be a large portion of activities following the project's completion. Board members opined that this briefing adequately addressed the recommendations from the minutes of the July 1996 SAB meeting that requested this project to provide a future SAB update with project details. The Board commended the PI on the quality of research conducted under the project.</p>

TITLE/AGENCY/ REQUESTED FUNDING	SUMMARY	RECOMMENDATION
<p>PP-1056: Low VOC Chemical Agent Resistant Coatings (CARC) (Army Armament Research, Development, and Engineering Center) \$900K (FY98)</p>	<p>The technical objective of this continuing project is to develop a low VOC chemical agent resistant coating (CARC) suitable for use on military equipment by all services, in which the materials and processes for the reformulation/application, stripping, and disposal are optimized and are in compliance with current and anticipated regulatory requirements. The primary deficiency in the current CARC is the excessive VOC level of the polyurethane topcoat. The existing CARC topcoat has a VOC content of 3.5 #/gal, while the local regulations are 2.8 #/gal in the San Diego Air Quality Management District. Moreover, some installations must limit VOC contents to 1.8 #/gal in order to meet total VOC emission limits imposed by regulatory agencies. At the current annual usage nationwide, estimated to be 3.0 million gallons per year, a CARC with a VOC content of 1.8 #/gal would reduce VOC emissions during the applications by at least 5 million pounds proportionately reducing photochemical smog, and avert Notices of Violation (NOVs) at various DoD facilities.</p>	<p>(June) Although generally pleased with the technological achievements outlined by the PI, the Board believed that the project schedule should be more aggressive. Calling on the project to take a more aggressive approach to seek out an actual application, especially involving the Air Force, Board members recommended the project be restructured to take advantage of the progress made to date. The Board moved to approve the project with the recommendation that: (1) the project be restructured to take advantage of the progress made to date; (2) the PI should build upon accomplishments to more aggressively seek outside support in order to accelerate transition to demonstration/validation; (3) SERDP funds should be applied to the environmental issues of the CARC effort; and (4) the project should report back to the Board in FY98. The project with recommendations was approved by a vote of 8-0.</p>
<p>PP-1057: Elimination of Toxic Heavy Metals from Small Caliber Ammunition (Army Armament Research, Development, and Engineering Center) \$900K (FY98)</p>	<p>The objective of this continuing project is to eliminate the major toxic materials from small caliber ammunition (5.56mm, 7.62mm, 9mm, and 0.5mm) which meets US and NATO performance standards. It will develop composite materials to replace lead-antimony in projectile cores and will investigate metastable interstitial composites (MIC) as alternatives to lead-styphnate in cartridge primer compositions. A MIC material is an engineered energetic material consisting of two or more chemical species that are exothermically reactive with each other. A typical MIC composition consists of a metal and a metal-oxide oxidizer, both of which are ultra-fine grain form. The MIC composition proposed for use in ammunition primers is a stoichiometric mixture of aluminum and molybdenum. The reactants of this reaction are non-toxic and environmentally benign.</p>	<p>(June) The Board was appraised of the specific efforts within the project to investigate tungsten as a replacement for lead in small caliber ammunition and recover tungsten from test ranges. The Board raised questions concerning tungsten recovery research, specifically the liquid media being utilized in the recovery procedure. Board members asked whether any work was being dedicated to tungsten speciation research in various types of soil, suggesting that some existing corrosion models might be helpful to analyze the tungsten speciation. The Board moved to approve FY98 funding for the project with the recommendation to accept the amended title. The project was approved by a vote of 7-0.</p>
<p>PP-1058: Elimination of Toxic Materials and Solvents from Solid Propellant Components (Army: Missile Command - Huntsville) \$1,420K (FY98)</p>	<p>This continuing project's overall goal is to support the "Green Missile" program to eliminate major sources of toxic/hazardous materials used in solid rocket propulsion systems. The project's specific objectives are to: (1) develop lead-free extrudable and castable propellant for minimum smoke systems; (2) develop complete and clean, HCl-free, combustion of propellant; and (3) develop solventless methods for processing energetic oxidizers.</p>	<p>(June) The Board raised concerns regarding the technology transfer aspect of the project, noting limited direct involvement of the Air Force with the project in view of the number of Air Force weapons systems impacted by the project. Board members agreed that the biggest impact of the work would involve future systems, not retrofitting existing systems; thus reinforcing the concerns regarding the lack of Air Force involvement with the project. The Board moved to approve funding for the project with a recommendation that clear documentation of the Tri-Services involvement with the project to be provided at the project's next briefing to the SAB for approval of FY99 funding. The project was approved by a vote of 7-0.</p>

TITLE/AGENCY/ REQUESTED FUNDING	SUMMARY	RECOMMENDATION
<p>PP-1059: Next Generation Fire Suppression Technology Program (NGFSTP)</p> <p>(DDR&E/National Institute for Standards and Technology)</p> <p>\$3,500K (FY98)</p>	<p>The goal of this continuing "umbrella" program is to develop and demonstrate, by 2004, environmentally friendly and user safe processes, techniques, and fluids that meet the operational requirements satisfied by halon 1301 systems in aircraft, ships, land combat vehicles, and critical mission support facilities. The results will be applicable specifically to fielded weapon systems and will provide dual-use fire suppression technologies for preserving both life and operational assets. The program is divided into the following six fully integrated technical thrusts each with sequential and synergistic research elements: (1) Risk Assessment and Selection Methodology, (2) Fire Suppression Principles, (3) Technology Testing Methodologies, (4) New Suppression Concepts, (5) Emerging Technology Advancement, and (6) Suppression Optimization. In all, the NGFSTP framework consists of 32 research elements. The research activities within these elements will begin identifying and developing fire suppression technologies within the first year, and additional knowledge will be added continuously throughout the life of the program.</p>	<p>(August) Board members questioned the level of technical oversight currently provided over the large project, as represented by the four members of the project's Technical Coordinating Committee (TCC). These concerns included the adequate oversight of the technical progress of large SERDP projects, specifically concerning the establishment of a technical advisory group to provide valuable outside views/reviews. The Board was advised that the Halon Alternative Steering Group was serving in that capacity, as well as providing valuable user input. The Board moved to recommend approval by a vote of 7-0.</p>
<p>PP-1072: Insensitive Munitions</p> <p>(Office of Naval Research)</p> <p>\$1,500K (FY97-Earmark)</p>	<p>This Congressionally-directed project's objectives are to: (1) develop benign energetic materials which provide for safer, more cost effective insensitive munitions which meet increasingly stringent environmental regulations and (2) bring together a number of modeling and simulation modules which make possible the design of a gun propellant which meets all operational requirements.</p>	<p>(June) The Board raised questions about the origin of the project and the Board's responsibility in reviewing the project as briefed. Questioning the level of research conducted under the project, Board members suggested that the work was too focused on improving Army systems and not dedicated to environmental research. Discussing the background of prior earmarks under the SERDP Program, Board members voiced concerns regarding the lack of applicability of the project to the SERDP mission, which led to the formulation of a motion to adequately capture their precise sentiments toward the Earmark. The Board came to a consensus that was read as follows:</p> <p>The Scientific Advisory Board recommends that SERDP project PP-1072: Insensitive Munitions, not be funded. This is a Congressionally-mandated program. Whereas the scientists involved have tried to formulate a useful program to meet the Congressional intent of these mandated funds, the effort does not further SERDP objectives for two basic reasons:</p> <ol style="list-style-type: none"> 1. Insensitive Munitions does not represent an area consistent with the SERDP mission; 2. Expenditures for the project will not further the strategic environmental objectives of SERDP.

TITLE/AGENCY/ REQUESTED FUNDING	SUMMARY	RECOMMENDATION
PP-1072: Insensitive Munitions (Office of Naval Research) \$1,500K (FY97-Earnmark) (continued)		<p>The SAB recommends that the SERDP Council take whatever actions necessary to eliminate SERDP expenditures for this project and to discourage future SERDP earmarks. Generally, Congressionally-mandated SERDP programs bypass critical review procedures mandated by Federal law, as well as critical checks and balances necessary for project funding. There is a significant risk that the quality of SERDP-funded R&D and the usefulness of projects to DoD and DOE will thereby be undermined.</p> <p>The perfected motion was formally approved by a vote of 7-0.</p>
PP-1074: Tri-Service "Green" Gun Barrel-A Physical Vapor Deposition (PVD) Technology for the Application of Environmentally Safe Coatings for Gun Barrel Bore Protection (Army: Benet Laboratories) \$550K (FY98-New Start)	<p>The objective of this proposed FY98 new start is to develop a dry (non-aqueous), environmentally clean process for the deposition of zero-valent chromium (non-hazardous), or other materials equally suited for gun barrel bore protection, to replace the aqueous electrodeposition process. The novel, non-polluting process is known as the Cylindrical Magnetron Sputtering Process, with the ultimate goal, after demonstration and validation for medium caliber gun barrels, to apply and demonstrate the process in large caliber barrels.</p>	<p>(August) During the briefing, Board members questioned whether the proposed sputtering technology had other applications. The Board inquired about the relative cost of tantalum versus chromium, the current gun barrel plating and discovered that tantalum costs \$400 per pound, but there is an overall cost benefit when factoring in the elimination of the extensive waste treatment costs of the current chromium-based process. The Board moved to recommend approval of the project and the motion was approved 6-0 with 1 abstention (Dr. Thomas).</p>
PP-1075: Replacement Non Toxic Sealants and Potting Compounds for Standard Chromated Sealants and Leaded Potting Compounds (DOE: Sandia National Lab) \$500K (FY98-New Start)	<p>The objective of this proposed FY98 new start is to identify candidate replacement non-chromated sealants and lead-free potting compounds to provide improved properties over current: (1) existing chromated sealants meeting the requirements of MIL-SPEC-81733C and (2) leaded potting compounds meeting the requirements of MIL-SPEC-8516F. Chrome-free, fast curing, non-VOC, and lighter weight materials will be developed, tested, and transitioned. The new non-toxic sealants will be tested on KC-135 and B-52 aircraft in coordination with Tinker AFB to demonstrate performance and the new potting compounds will be tested on F-15 and F-16 aircraft in coordination with ACC and AMC.</p>	<p>(August) The Board raised questions regarding the justification of SERDP involvement in funding this research that has industrial application and industrial formulators involved in the project. Citing claims made by the PI related to certain project goals, Board members opined that ascertaining the status of industrial development of sealants and potting compounds should be accomplished before approaching SERDP for funding. The Board raised issues regarding the relevance of the proposed research to SERDP, citing that two of the three project benefits were not relevant to the SERDP mission. The Board moved not to recommend funding for this project, citing a lack of technical merit and poor SERDP relevance. The proposal was rejected by a vote of 7-1.</p>

TITLE/AGENCY/ REQUESTED FUNDING	SUMMARY	RECOMMENDATION
<p>PP-1076: Tactical Vehicle Washing Waste Stream Reduction (Naval Air Warfare Center) \$290K (FY98-New Start)</p>	<p>The objective of this proposed FY98 new start is to: (1) develop a more cleanable aircraft exterior surface; (2) provide more efficient cleaners; (3) improve the treatability of the waste stream; and (4) reduce the logistics costs. The successful completion of this project should result in reducing the volume of the cleaners used and maintenance effort required for tactical vehicle washing by at least 50 percent. As an additional benefit, the occurrence of aircraft repainting should be greatly reduced, since the original optical properties of the tactical paint schemes will be maintained.</p>	<p>(August) Board members questioned the scientific basis for the project presented in the overview and the scientific basis to meet the goals of the project. The Board voiced concerns that the project, based on the information presented, did not appear to incorporate in its development of coatings certain criteria/properties that determine the adequacy of an aircraft coating. Other Board members cited the difficulties in addressing the vehicle/aircraft washing issue and the leveraged funding from the services. They discussed the apparent lack of coordination with ongoing SERDP projects involving aircraft coating research and the lack of sufficient information provided in the project brief to make an effective determination. In the absence of a quorum, the motion to approve was rejected by a vote of 2-3, with Board members reinforcing that the rejection was without prejudice and was based primarily on the lack of sufficient, key project information in the presentation.</p>
<p>PP-1109: Non-Polluting Composites Repair and Remanufacturing for Military Applications (Army Research Lab) \$692K (FY98-New Start)</p>	<p>The objective of this proposed FY98 new start is to research, develop, and demonstrate a unique, affordable, environmentally friendly family of polymer-matrix composite (PMC) manufacturing and repair technologies for stand-alone repair of current, soon-to-be-fielded, and future DoD structures. Pollution prevention technologies associated with vacuum assisted resin transfer molding (VARTM) and various curing technologies including electron beam and ultraviolet light of composites and adhesives and recycling of fabric prepreps will be advanced. Repair concepts and technologies will be demonstrated on three DoD-specific problems, including the design and implementation of a non-autoclave repair procedure for the oft-repaired Army's helicopter rotor blades, the development, demonstration, and documentation of a repair-friendly processing method for the remanufacture of the Navy's future fielding of the Advanced Enclosed Mast Sensor System (AEMSS), including multi-functional material development of several advanced concepts for non-autoclave repair of aircraft skins for the Air Force and Navy.</p>	<p>(September) Board members raised several concerns regarding the environmental benefits of the project versus improved manufacturing processes, specifically questioning the environmental savings from Advanced Enclosed Mast Sensor System (AEMSS). The Board expressed concern about the lack of details of scientific research in the presentation, specifically the delineation between known and unknown parameters in the project. Noting the absence of leveraged funding by the beneficiaries of this development, such as Air Force, Navy, Northrop, ARL, etc, Board members opined that the proposed work is an interesting idea from manufacturing/maintenance perspective but does not qualify as an environmental project since pollution prevention appears to be a secondary objective of this project. Board members suggested that individual services should be funding this type of project. Citing the concerns voiced regarding the project's environmental relevance, the Board moved to defer approval for the project and requested the project return and rebrief the Board. The Board requested that the next briefing present: (1) a demonstrated ability to quantify the environmental benefits to be accomplished; (2) a clear quantification of how SERDP funds will be leveraged with manufacturer's and user's funds; (3) a clear definition of the term "non-polluting;" and (4) the specific research components of this effort. The motion, as amended, was approved by a vote of 8-0.</p>

TITLE/AGENCY/ REQUESTED FUNDING	SUMMARY	RECOMMENDATION
<p>PP-1110: Genetic Enhancement of an Anti-Freeze Protein for Use as a Substitute for Ethylene Glycol for Aircraft Deicing (Aspen Systems)</p> <p>\$200K (FY98-New Start)</p>	<p>The objective of this proposed FY98 new start is to produce novel deicing and anti-icing agents using naturally occurring antifreeze proteins, which have a very low Biological Oxygen Demand (BOD) compared to the current agents. The project intends to build on initial research indicating <i>Dendriodes canadensis</i> protein found in insects can produce a significant freezing point depression, specifically intending to genetically alter the <i>Dendriodes canadensis</i> antifreeze protein gene in order to enhance the freezing point depression capabilities and, therefore, increase its usefulness and value as an aircraft deicing/anti-icing agent.</p>	<p>(September) Board members cited the lack of adequate environmental testing protocols, evaluation of ecological impacts, material compatibility, scale-up, and regulatory impacts of the proposed research. The Board also expressed concern regarding the lack of adequate environmental expertise on the project team, citing the invalid BOD testing used and questionable results reported in the proposal submitted and questioned the expertise of the proposed environmental testing subcontractor. Board members also raised concerns about the compatibility issues associated with application/adhesion of this protein on the aircraft surface, specifically the formation of new surfaces that could be a corrosion source. The Board moved to recommend approval of the project with a caveat that: (1) the project be briefed to the Board before receipt of FY99 funding and (2) the PI incorporate proper environmental protocols and take advantage of available technical expertise in environmental testing. The amended motion was approved by a vote of 7-0; Mr. Conway abstained and opined that ethylene and propylene glycols have low aquatic toxicity and are neither persistent nor bioaccumulative, and hence are not a high-priority environmental concern.</p>
<p>PP-1111: Environmentally Advantaged Substitutes for Ethylene Glycol for Aircraft Ice Control (Foster-Miller, Inc.)</p> <p>\$690K (FY98-New Start)</p>	<p>The objective of this proposed FY98 new start is to develop a high performance, environmentally benign aircraft anti-icing fluid which can be safely released to the environment without post-treatment. Specific objectives are to: (1) develop a molecular modeling approach which allows for the prediction of non-Newtonian viscosity behavior of materials based on their chemical structure; (2) develop a non-toxic, non-Newtonian thickening agent with enhanced performance capabilities for anti-icing fluids, particularly extended holdover times; (3) select low environmental impact performance-enhancing additives; (4) demonstrate that the anti-icing formulations are compatible with aircraft materials; (5) demonstrate the ability of the anti-icing formulations to prevent ice formation for extended periods of time in simulated adverse weather environments; (6) develop encapsulated enzyme additives which exhibit controlled release properties and actively degrades the anti-ice formulation at reduced temperatures; (7) predict the water quality impact of new anti-ice formulations at actual airfield sites using computer modeling and laboratory analysis of key environmental parameters; (8) determine any potential health/safety risks of anti-icing formulations; and (9) develop cost-effective anti-icing formulations by screening out excessively costly materials throughout the testing program.</p>	<p>(September) Board members voiced concerns regarding the technical approach and the transition plan for the proposed research, specifically questioning the choice of performers of the environmental testing aspect of the project. Board members raised a number of issues associated with the technical approach including: (1) the encapsulation of enzymes; (2) aquatic toxicity testing; (3) deliverables from modeling of non-newtonian fluids; and (4) the uncertainty of using thixotropic compounds (proposed process may add more harmful compounds into the environment, since very little scientific data exists on the degradation mechanism of these compounds). While commenting that this project is responsive to the statement of need (SON), Board members noted concerns about the leveraging with the user community, specifically the out-year funding requests without the active support and involvement from users. With consideration of the concerns voiced, the Board moved to approve FY98 funding for the project with a caveat that: (1) the project return and rebrief the Board prior to receipt of FY99 funding and (2) the PI develop a strong transition plan by interacting with users. The motion was amended to include an action item for the briefer to provide information to the Board on the qualifications of the facility assigned to conduct environmental impact testing and the organization that will perform modeling of water quality impacts. The amended motion was approved by a vote of 7-0; Mr. Conway abstained and opined that ethylene and propylene glycol have low aquatic toxicity and are neither persistent nor bioaccumulative, and hence are not a high-priority environmental concern.</p>

TITLE/AGENCY/ REQUESTED FUNDING	SUMMARY	RECOMMENDATION
<p>PP-1112: Recycle and Reuse of Industrial Cleaning Rags Using Liquid CO₂ and Surfactant Additives as a Cleaning Agent</p> <p>(USEPA: NRMRL, Research Triangle Park)</p> <p>\$439K (FY98-New Start)</p>	<p>The technical objectives of this proposed FY98 new start are to develop, demonstrate, and evaluate liquid carbon dioxide (LCO₂) fabric cleaning technology using selected surfactant additives for application to the cleaning of DoD generated industrial cleaning rags. The proposed program is divided into four phases: (1) contaminant identification, preliminary system specifications, and cleaning requirements; (2) laboratory bench-scale evaluations and feasibility studies of surfactant enhanced LCO₂ rag cleaning; (3) full-scale system tests and evaluations; and (4) technology transition.</p>	<p>(September) The Board raised several concerns regarding the research content of the proposal, funding request for each of the tasks, and lack of decision points in the span of the project. Stating that the proposed work appeared to be more of a demonstration/validation project, Board members questioned the research nature of the project and the strategic, environmental, DoD-unique nature of the problem being addressed by this project. Expressing concern about the proposed separation of surfactants and contaminants, including characterization of separated materials, Board members questioned the uniqueness of the process and indicated that supercritical carbon dioxide is widely used for contaminant identification and PAHs/PCBs are extracted in supercritical carbon dioxide. The Board indicated that the issues relative to the research required to synthesize and evaluate surfactants were not adequately presented. Suggesting that SERDP staff reevaluate the project, the Board motioned that the presenter take the constructive comments of the Board and return with a revised proposal for SAB consideration. The motion was approved by a vote of 8-0.</p>
<p>PP-1113: Sol-Gel Technology for Low-VOC, Nonchromated Adhesive and Sealant Applications</p> <p>(Air Force Research Lab)</p> <p>\$665K (FY98-New Start)</p>	<p>The objective of this proposed FY98 new start is to develop and transition to DoD and other organizations processes that eliminate the VOCs, chromates, and strong acids typically found in the metal surface treatment and priming steps conducted prior to the application of adhesives and/or sealants. Secondary objectives are the reduction of hazardous wastewater streams associated with current processes and improved performance compared to these processes. This project intends to build on recent work using non-chromated, zero-VOC, sol-gel technology to deposit thin organic-inorganic coatings on metal surfaces in order to develop good adhesion between the metal and subsequently applied polymers (primer, adhesive, or sealant) via covalent chemical bonding.</p>	<p>(September) The Board questioned aspects of the science involved in the project, specifically the requirement that the surface has to be cleaned before Sol-Gel is applied on metal surfaces in order to have effective bonding. Commenting that the project presents an opportunity for advancement of science specifically to do molecular modeling work to forecast condensation processes and to predict the changes in nature of bonding with time, Board members recommended that the PI include quantitative structural activation reaction (QSAR) modeling into the project. Suggesting that the PI should seek additional technology transition opportunities that are very relevant to this technology, Board members strongly suggested that the SERDP staff should track the project closely due to its significant success potential. The Board expressed concern about the lack of details in the briefing of chemistry involved in the project, to which the PI responded that the detailed chemistry was not presented but assured the Board that refined chemistry evolving from an earlier SERDP project, PP-130, is the basis for success of the project. The Board motioned to recommend approval for FY98 funding as requested with a caveat that the project be rebriefed to the Board prior to receipt of FY99 funding, and that the briefing shall address the details of the science involved and accomplishment of the project. The Board voted 7-0 to approve the motion, with Dr. Shreeve abstaining.</p>

APPENDIX C

SAB BYLAWS

SERDP SCIENTIFIC ADVISORY BOARD BYLAWS

10 U.S.C. §2904(d) provides that, "(t)he Advisory Board shall prescribe procedures for carrying out its responsibilities. Such procedures shall define a quorum as a majority of the members, provide for annual election of the Chairman by the members of the Advisory Board, and require at least four meetings of the Advisory Board each year."

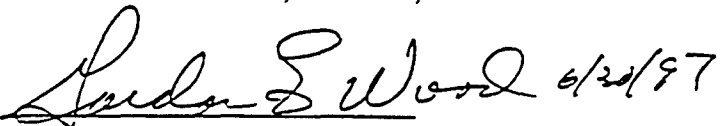
Consistent with this statutory authority, the SERDP Scientific Advisory Board (SAB), by a vote of the majority of the members, a quorum being present, adopts the following Bylaws to be effective immediately and to remain in effect unless and until amended.

1. Meetings of the SAB - The SAB shall meet not less than four times per year (Required by statute). Written notice of SAB meetings shall be provided to members at least 15 days prior to each meeting.
2. Election of Chair - There shall be an annual election of a Chair and Vice Chair of the Advisory Board before the beginning of each fiscal year. (Annual election of Chair required by statute)
3. Quorum - A quorum for meetings of the Scientific Advisory Board (SAB) is a majority of the members of the SAB. (Required by statute)
4. Proxy voting - Proxy voting at meetings of the SAB shall be permitted only in accordance with the following:
 - a. A quorum is present. Proxies shall not be used to create a quorum.
 - b. Proxy votes may be cast by any other member present on behalf of any absent member, pursuant to instructions by such absent member, on SAB recommendations to the Council that the SAB considers appropriate regarding any proposed research project referred to the SAB or any other recommendation.
5. Emergency Actions - Notwithstanding the requirements for a quorum set forth in paragraph 4., above, the Chair may permit actions to be taken by the SAB in the absence of a quorum if he or she determines that not to proceed in the absence of a quorum might deprive the Council of the timely views of the members of the SAB present, provided at least four members are present. Any such actions by the SAB in the absence of a quorum are null and void unless they are ratified by the SAB (a) at a later time in the same meeting, a quorum being present, (b) after discussion at the next meeting of the SAB, a quorum being present, or (c), via a majority vote of all the members of the SAB via FAX, all members of the SAB having received written notice of the issue at hand. Any member of the SAB may request a teleconference to discuss and vote upon such ratifications in lieu of a vote via FAX. If so requested, any such discussion and voting shall be via teleconference and a quorum shall be present.

Notwithstanding the preceding, if recommendations are made by the SAB when a quorum is not present and such recommendations could not be subsequently ratified in accordance with the above procedures because of the continuing unavailability of a quorum, the Chair may inform the Council of such recommendations and the fact that a quorum was unavoidably not available.

6. SAB Member Participation - Effective functioning of the Board depends upon regular participation and attendance by members. The very broad spectrum of issues addressed by the Board requires full review by a multi-disciplined membership. This is consistent with statutory requirements addressed in paragraph 1 regarding the minimum number of meetings per year and in paragraph 3 regarding a quorum. Members are volunteers with many other responsibilities and schedules, priorities and capabilities, and Member ability to participate may change. If so, it is necessary that Members inform the Board Chair of such changes which will affect their ability to attend meetings and participate fully, so the Member and Chair together may consider appropriate recommendations to the Executive Director. Further, if a member's persistent absence is perceived to be deleterious to the Board's utility and operations, and if the Chair deems it appropriate, the Chair or Vice Chair, at the Chair's request, shall discuss with that Member, his or her ability to continue to serve actively. After each such discussion the Chair or Vice Chair, at the Chair's request, or the Member, if the Member so requests, shall make a verbal report to the Executive Director, including any recommendations that the Member, in his or her discretion, deems to be appropriate.

APPROVED BY A MAJORITY VOTE OF THE SAB,
A QUORUM BEING PRESENT, JUNE 19, 1997.

ATTEST:  6/20/97
Gordon E. Wood
Deputy Director and Counsel